AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

▲ ▲ ▲

VOLUME 21. NEW YORK, THURSDAY, MAY 5, 1898. NUMBER 18.

▲ ▲ ▲

Machinery in Warfare.

Hiram Maxim, in an interview printed in a London paper, said:

"Any superiority which the Spaniards have in the number of ships is overwhelmingly counterbalanced by the greater strength, equipment and speed of the American warships. Spain has no resources in the way of production of steel or the building of ships, while America's resources are thoroughly adequate."

In this Mr. Maxim has gone to the heart of the matter. Patriotism, or less lofty impulses, may lead us to consider ourselves braver and better fighters than our enemies, but battles only can decide that. We need no battles, however, to decide whether the United States or Spain is the better prepared to construct and to keep on constructing so long as

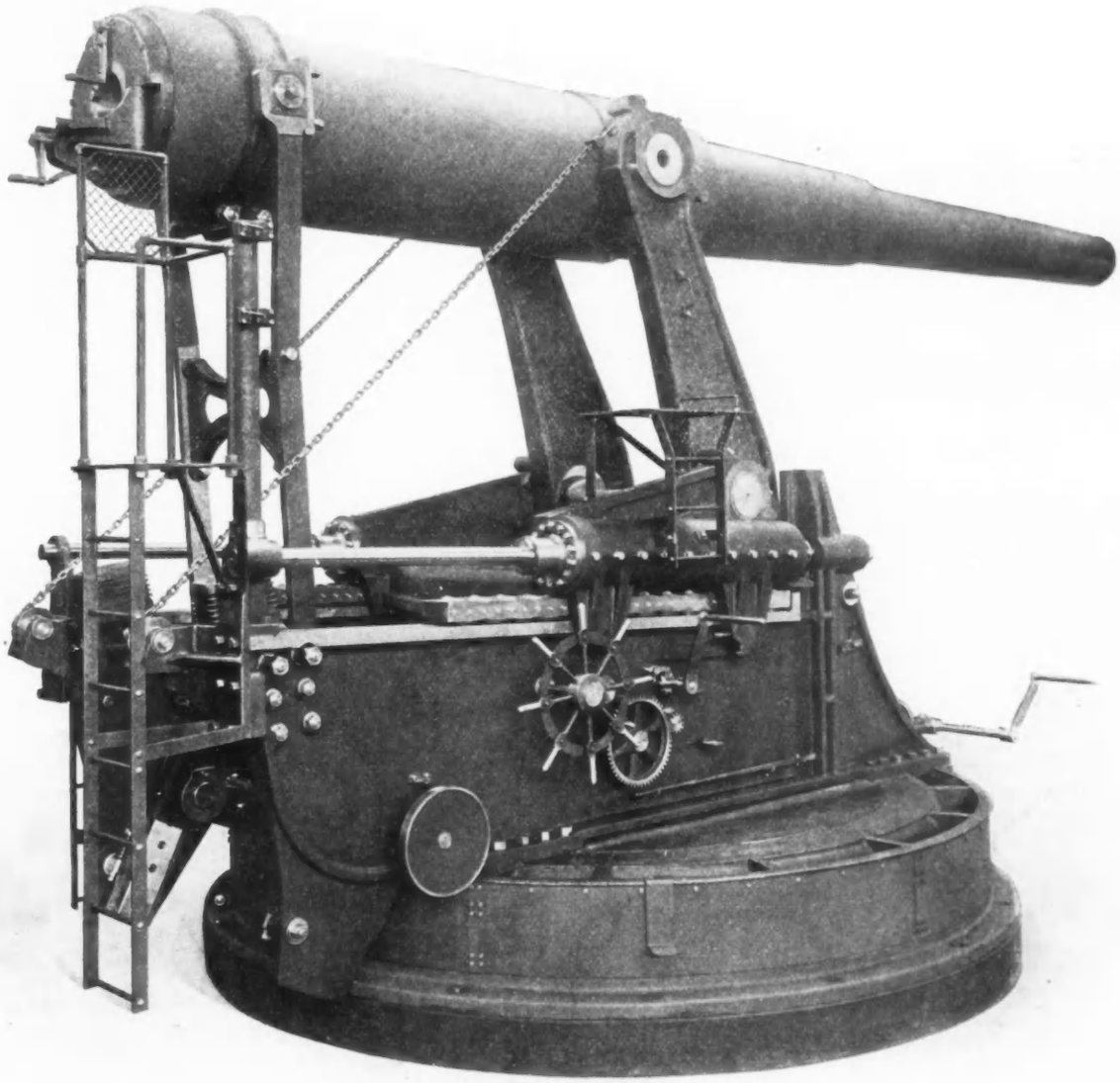


FIG. 1.—10-INCH BREECH LOADING RIFLE AND DISAPPEARING CARRIAGE. FIRING POSITION.

may be necessary the armament—the machines without which modern warfare is impossible.

In this issue we present some illustrations designed to give our readers some idea of our equipment in this respect. Of course we cannot illustrate nearly all the establishments nor even catalog them, but some of the leading ones engaged in the production of heavy ordnance are represented, and we think our readers will agree with us that the showing is an imposing one.

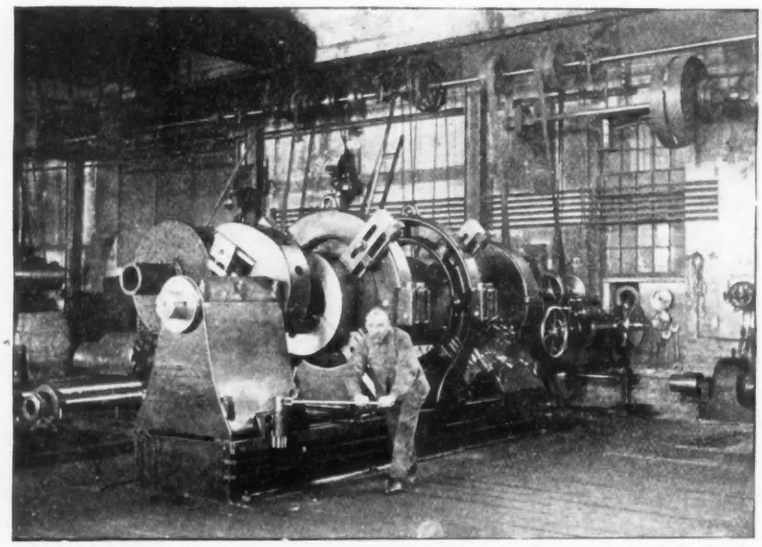


FIG. 2.—BORING AND FACING JACKET FOR BREECH LOADING RIFLED MORTAR. BUILDERS' IRON FOUNDRY.

Engineers and machine constructors play a very important part in modern warfare. Not only those who are engaged directly upon guns, gun carriages, projectiles, war ships and armor plate, but the countless others who at present are making machine tools and other equipment to be used by those who are making war material are of equal importance.

In some of the shops we visited in gathering the material for this issue we saw long lines of lathe headstocks finished and ready for the beds, and built especially for finishing projectiles. In fact, most of the private shops which have so far built gun carriages are employed chiefly on machine tools, and double shifts of men is the order of the day—and of the night.

There is good reason for believing that our advantage from the mechanical standpoint is not confined to the preparation of war material, but extends to the handling of it as well.

Our naval officers are, many of them, highly trained specialists in this regard. They are and for a long time have been in close touch with the naval gun shop; have been and are interested in its products, from the mechanical as well as from the military standpoint, and may be expected to derive great advantage from their mechanical skill. Clumsy and ignorant handling can by no possibility get the best results from fighting machines any more than from other kinds of machines. And the fact that modern warfare consists largely in cool and skillful handling of machines ought to give the nation whose people are most skilled and familiar with machinery a very great advantage.

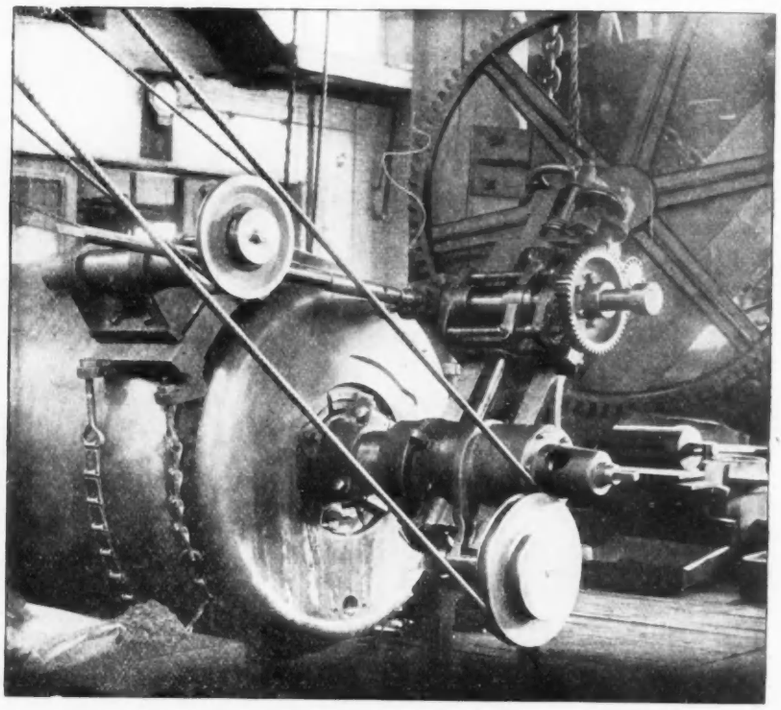


FIG. 3.—BREECH MORTICE MILLING MACHINE. BUILDERS' IRON FOUNDRY.

"The Engineer" Decides It.

Our last lingering doubt regarding the outcome of our naval conflict with Spain is removed by the publication of an editorial article in "The Engineer," of London, designed to show the superiority of the Spanish navy, in both equipment and personnel, and ending as follows:

"In point of fact, we do not believe that the Yankees thoroughly understand the spirit of mischief that they seem so determined to evoke."

True, we may not. But we thoroughly understand that whatever our able contemporary has to say about American affairs is inspired by blind and stupid prejudice, and should be read only after "changing the signs" all through.

▲ ▲ ▲

The Buffington-Crozier Disappearing Gun Carriage.

On the first page of this issue we give an illustration of one of the most modern fighting machines—a disappearing carriage for a 10-inch breech-loading rifled cannon; the particular machine shown having been built by the Niles Tool Works Company, of Hamilton, Ohio.

This carriage, known as the Buffington-Crozier, takes its name from its inventors, and its object is to provide a mounting for coast-defense guns which shall enable them to be readily pointed toward any part of the horizon, to be given any desired elevation, to be quickly brought into firing position when loaded and to immediately disappear from the view of the enemy as soon as fired.

The base therefore is circular in form, and between the lower or foundation

ring and the upper ring, which carries the carriage, is a floating ring carrying rollers, which bear the weight and reduce friction.

The gun is mounted by its trunnions

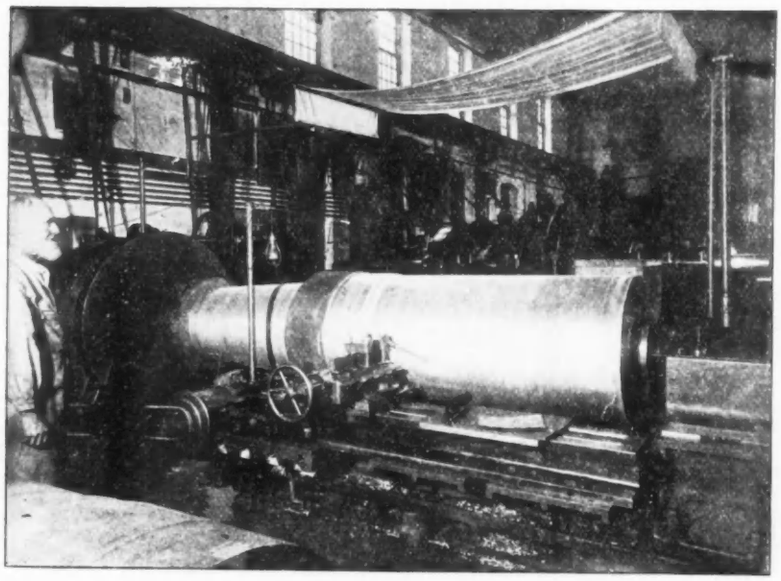


FIG. 4.—TWO PATRIARCHS. BUILDERS' IRON FOUNDRY.

at the ends of two massive levers, which have no fixed fulcrums. As shown in Figs. 1, 24, 25 and 26, with the gun in firing position, these levers are nearly vertical. After the discharge and recoil have taken place they are nearly horizontal, as shown in Fig. 23, where the gun is in loading position. At the left of Fig. 23, between the two side plates (called the chassis), are seen the lead weights, which are suspended from the lower ends of these levers and whose mass is sufficient to a little more than balance the weight of the gun and its charge.

The central fulcrums or trunnions of these levers are not fixed, but can travel along the chassis, running upon a series of anti-friction rollers, plainly shown in Figs. 1, 23, 25 and 26. This backward motion at that point is resisted by means of horizontal cylinders, as shown, within which a fluid is made to pass through properly graduated and restricted openings, and thus gradually absorb the energy of the moving mass and bring it to rest gently in the proper position for reloading.

The lower ends of the levers (to which the weights are attached) are guided so that they can move in a vertical straight line only, while, as already explained, the central pivots can move only in a horizontal straight line, the result being, in accordance with a familiar law of geometry, that the trunnions of the gun describe a path which is about one-fourth of an ellipse whose major axis is horizontal.

From this a little consideration will show that some very interesting results follow. Supposing the charge within the gun to be ignited, the projectile and the gun immediately begin to move in opposite directions with a velocity inversely proportional to their respective masses, these motions attaining their maxima at the moment the pressure of the confined gases is reduced by the discharge of the projectile from the muzzle. The initial movement of the gun is along the flat side of the ellipse, and during this part of the gun's movement the counterweights are practically at rest, since they can move only vertically. The first effect, therefore, is to move the upper carriage backward along the chassis against the fluid resistance referred to, and during this initiatory movement the mass to be set in motion is at a minimum. As the gun continues its movement, however, it begins to descend, and its motion approaches constantly nearer a vertical line, and thus the counterweights are gradually brought into motion; the rate of movement of gun and counterweights being practically equal at the final stage. Pawls attached to the vertical slides prevent the weights from descending, and when the gun has come to the loading position hold it there until they are disengaged by mechanism provided for that purpose, the weights then returning the gun to the firing position. All these motions seem to be entirely without shock, and as smooth as though the weights moved were ounces instead of tons. Elevation or depression of the muzzle is obtained by means of slides within the rear portion of the chassis, to which slides is attached the link pivoted to a ring fixed around the gun near the breech.

In Figs. 23 and 26 the small truck is seen by which the ammunition is brought to the gun. The floor line when the carriage is in use is considerably higher than the shop floor as shown—enough higher, in fact, so that the projectile in Fig. 23 is level with the breech, and the lip seen extending from the tray in front of the projectile enters the breech opening. The projectile is shoved over this lip to its place and the bags containing the powder put in behind it; these bags being carried on the trays, one of which is seen on each side of the ammunition truck.

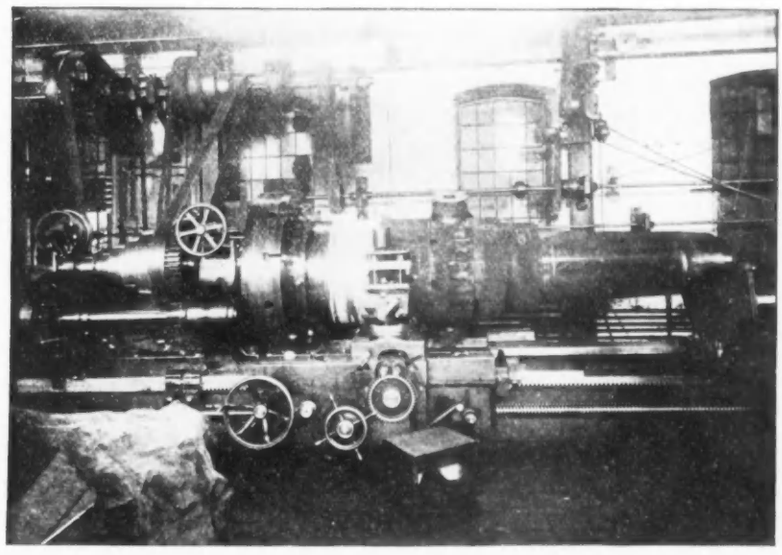


FIG. 5.—TURNING EXTERIOR OF 12-INCH BREECH LOADING RIFLED MORTAR. BUILDERS' IRON FOUNDRY.

The entire time required between two consecutive discharges of guns thus mounted can be made somewhat less than

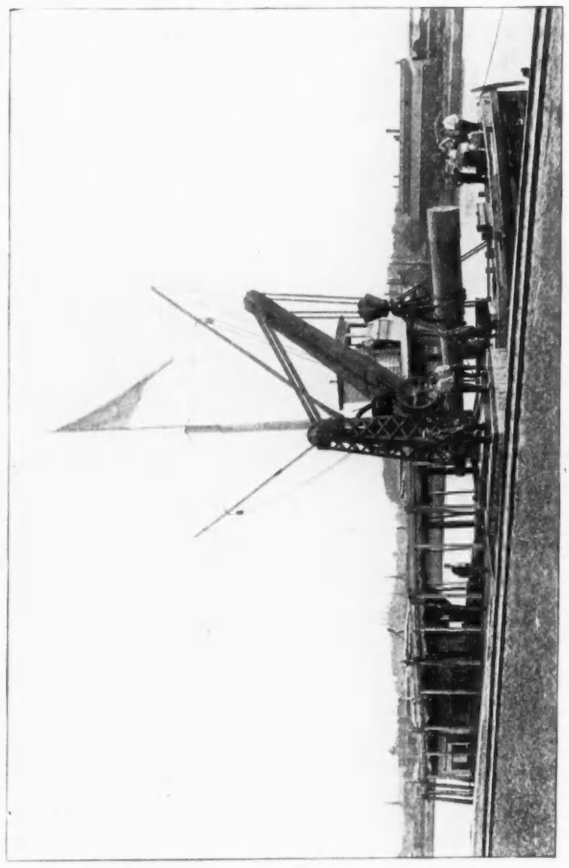


FIG. 7.—LOADING 10-INCH GUN ON BARGE.

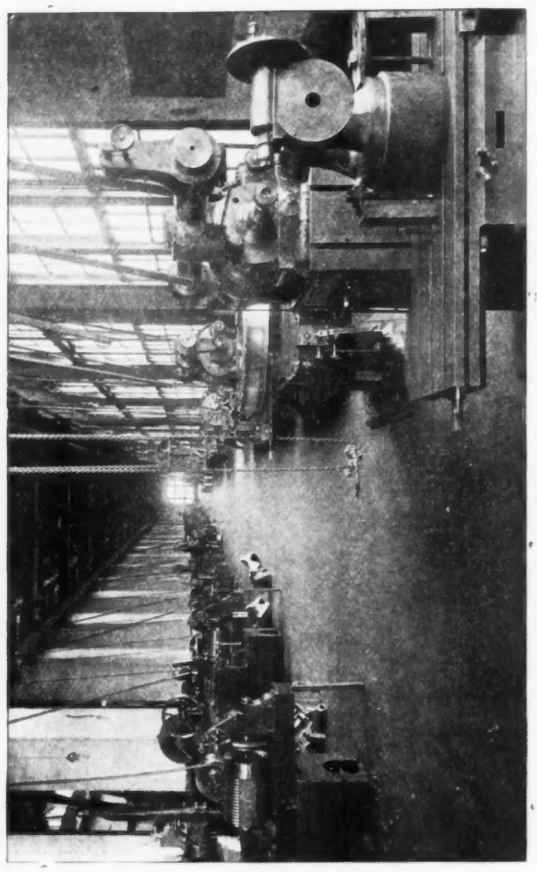


FIG. 9.—WORK ON BREECH MECHANISMS.

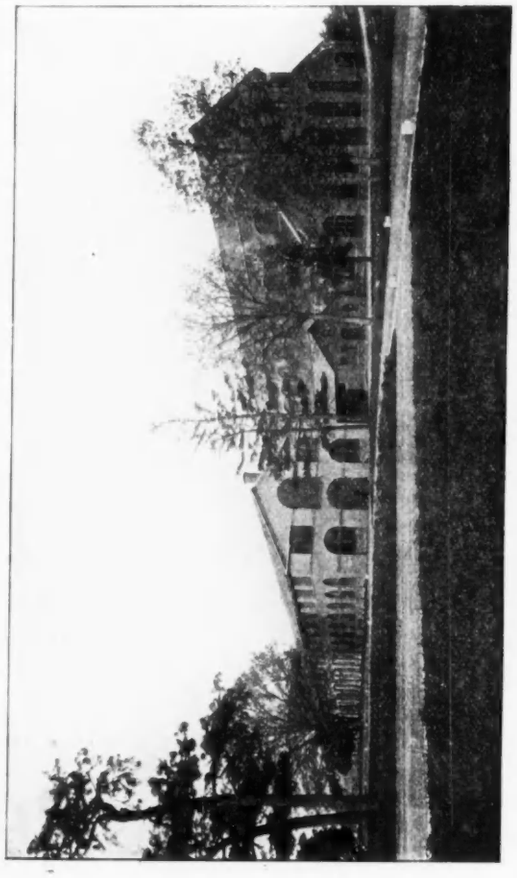


FIG. 6.—WATERVLIET ARSENAL GUN SHOPS.

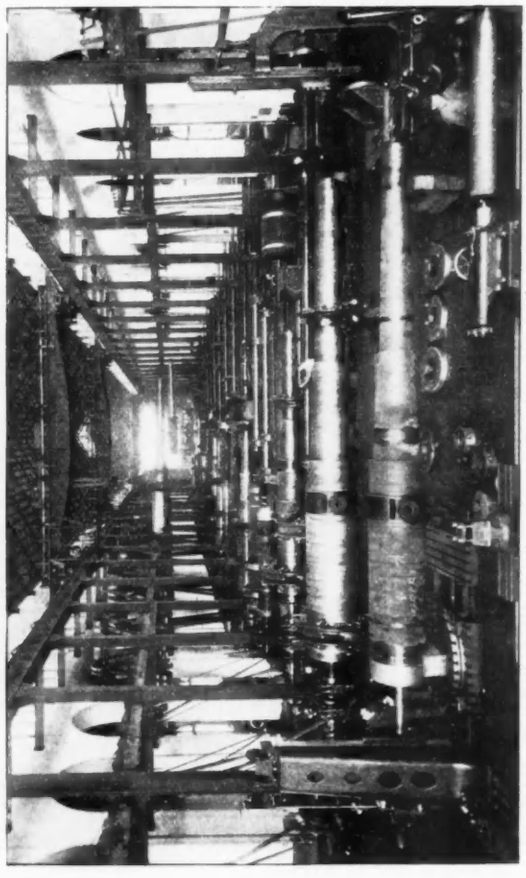


FIG. 8.—INTERIOR OF SEA COAST DEPARTMENT. 155 × 125 FEET.

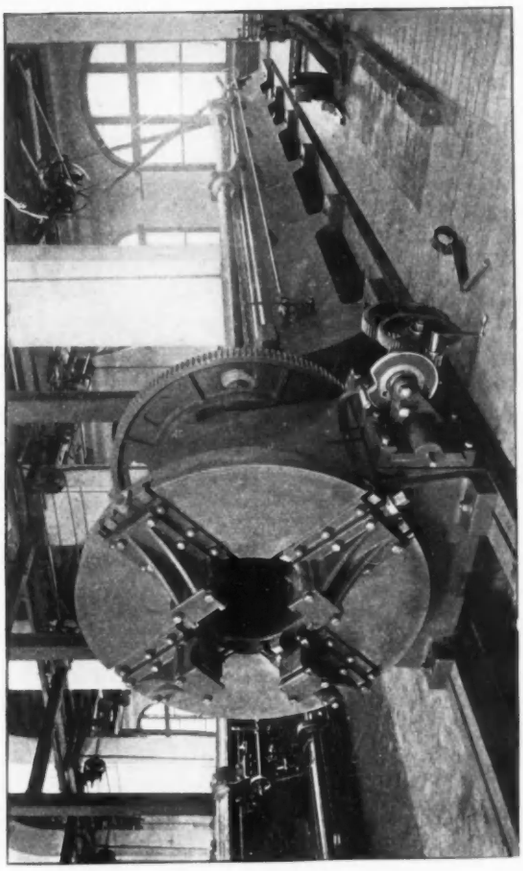


FIG. 11.—INDEX HEAD AND CHUCK OF 12-INCH RIFLING MACHINE.

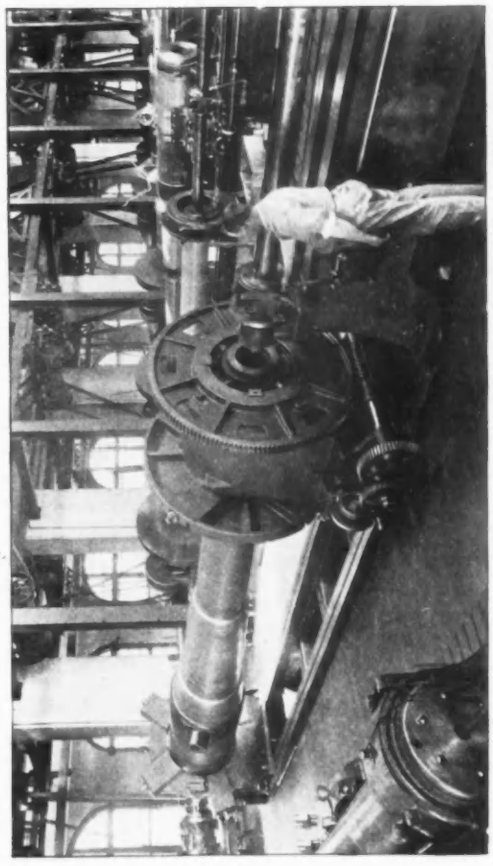


FIG. 13—RIFLING 12-INCH GUNS.

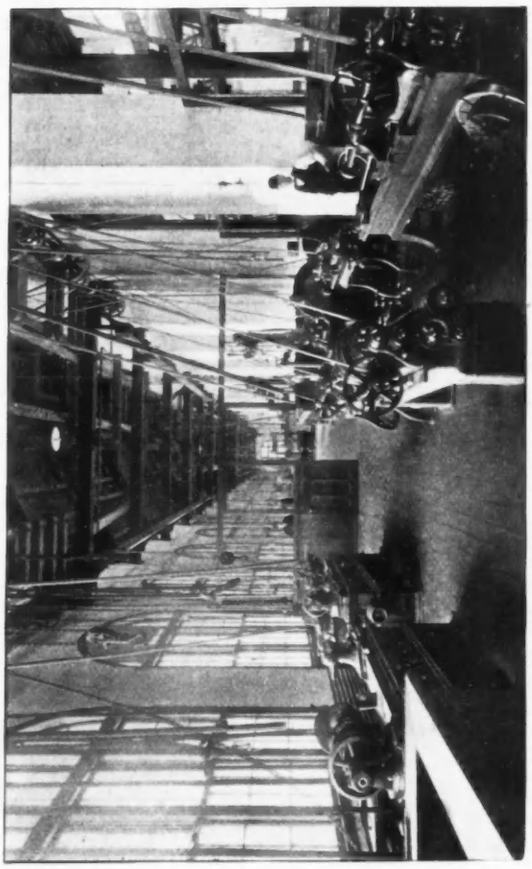


FIG. 10.—THE TOOL ROOM.

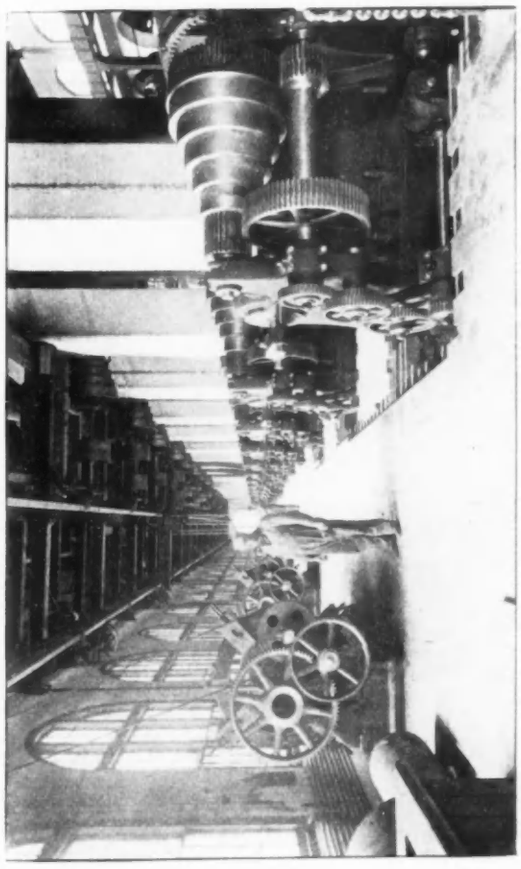


FIG. 12.—AN AISLE IN WATERVLIET ARSENAL. HEAD-STOCK ENDS OF GUN LATHES.

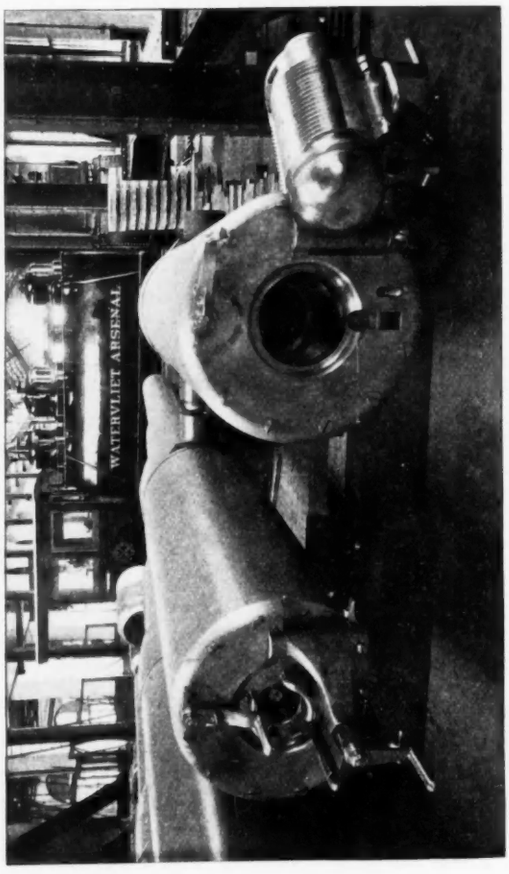


FIG. 15.—BREECH MECHANISM 8-INCH GUNS.

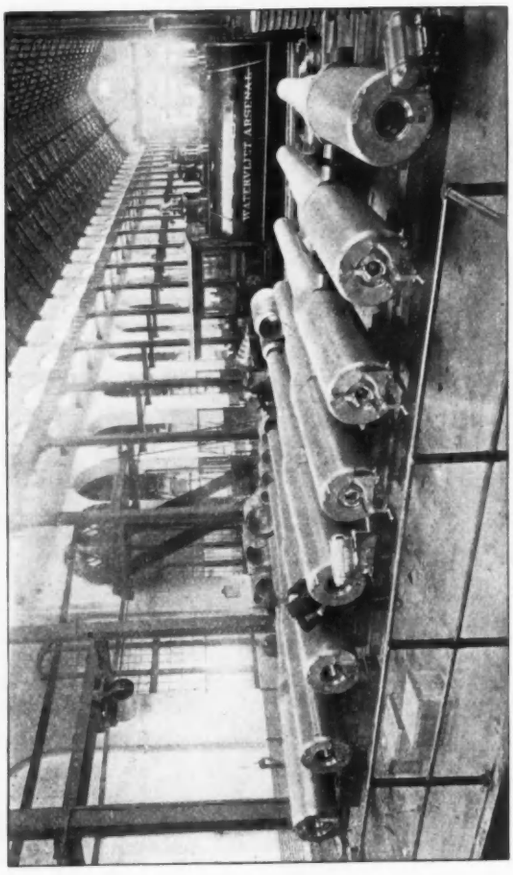


FIG. 17.—FINISHED 8-INCH GUNS READY FOR SHIPMENT.

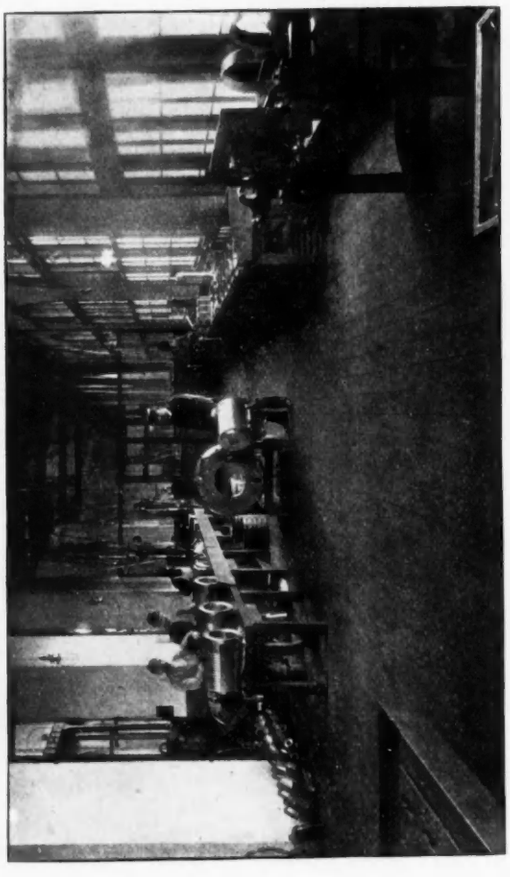


FIG. 14.—FITTING AND ASSEMBLING BREECH MECHANISMS.

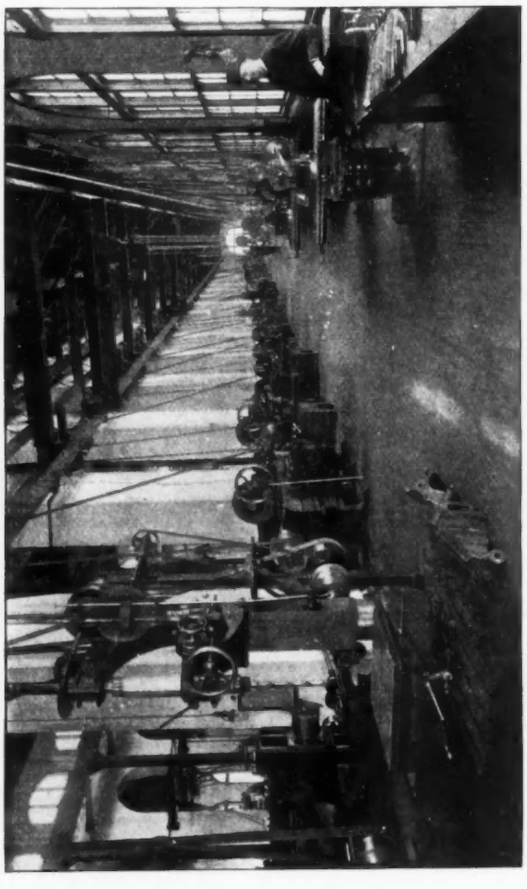


FIG. 16.—MACHINERY FOR BREECH MECHANISM WORK.

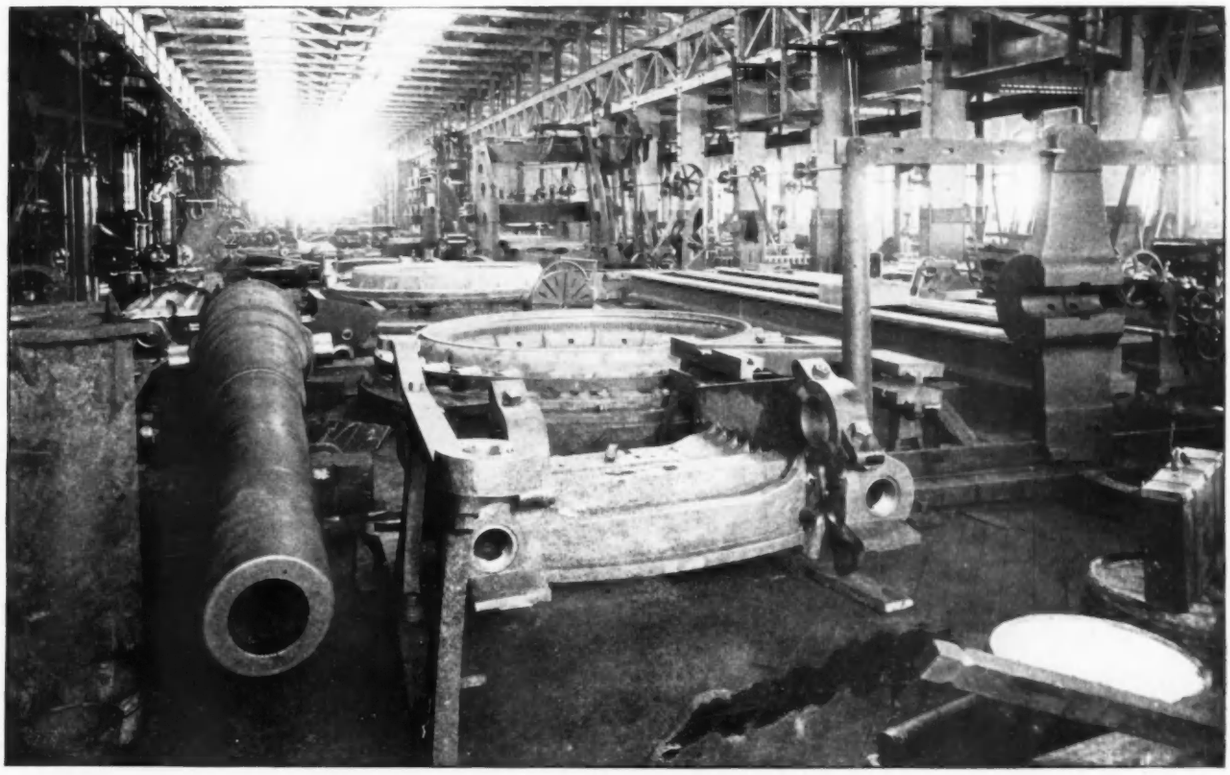


FIG. 18.—GUN CARRIAGE WORK IN THE SHOPS OF THE NILES TOOL WORKS.

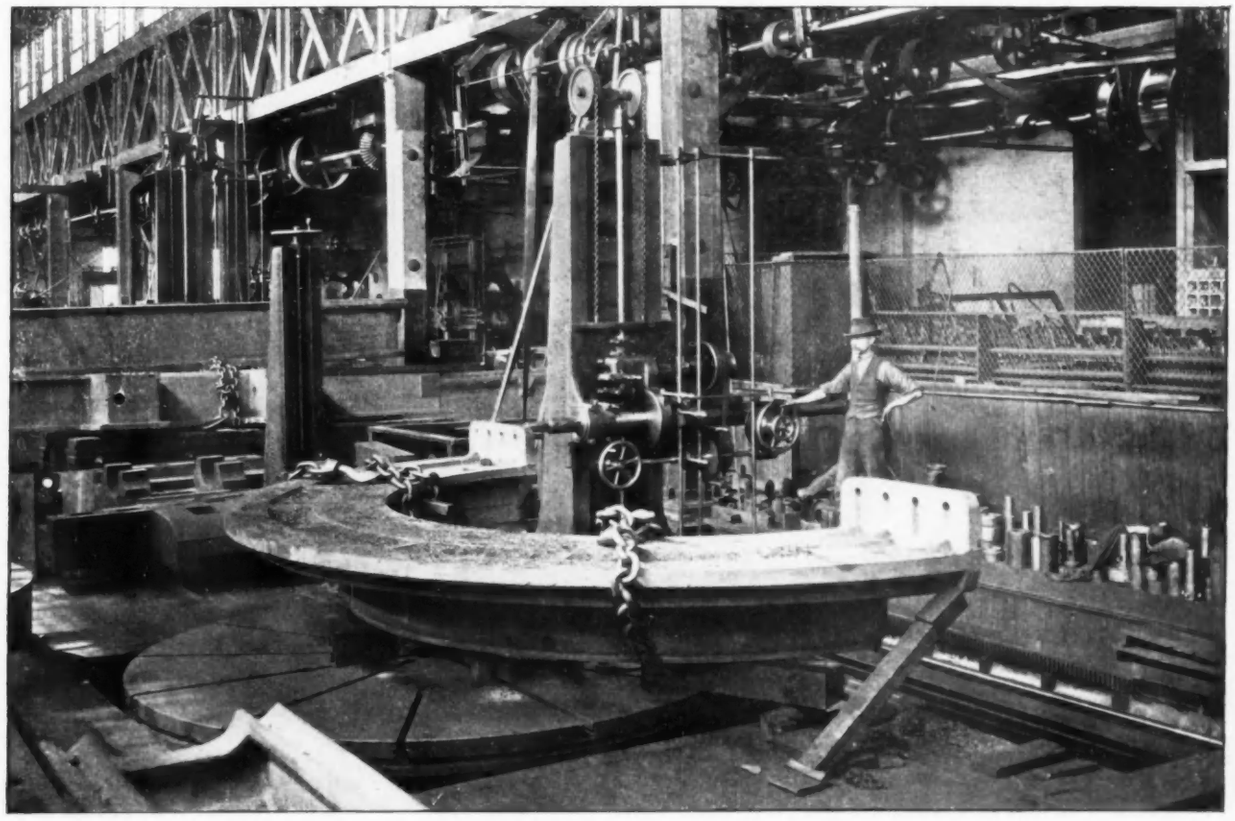


FIG. 19.—FACING AND DRILLING RINGS FOR DISAPPEARING GUN CARRIAGES. NILES TOOL WORKS.

FIG. 20.—TURNING AND BORING PARTS OF BREECH LOADING RIFLED MORTARS. NILES TOOL WORKS.

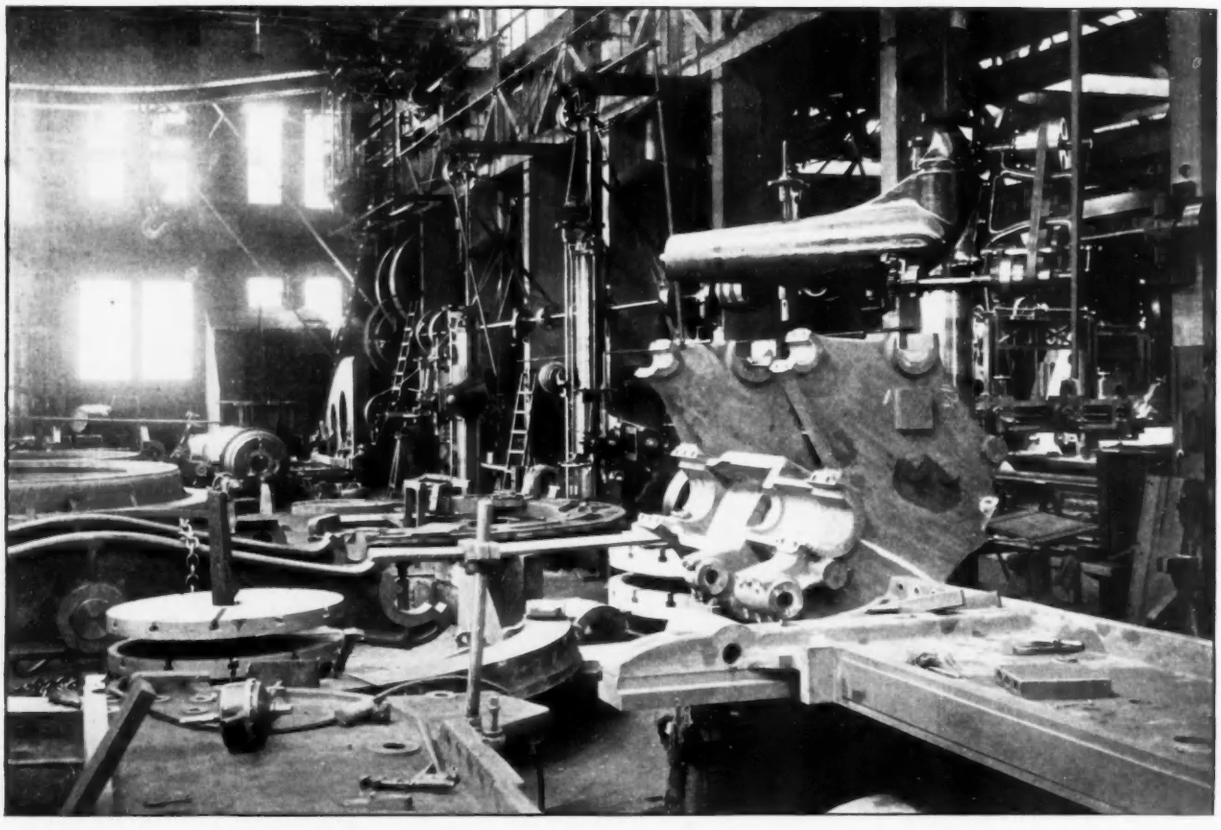


FIG. 21.—GUN CARRIAGE WORK AND HEAVY LATHE BUILDING FOR GUN WORK. NILES TOOL WORKS.

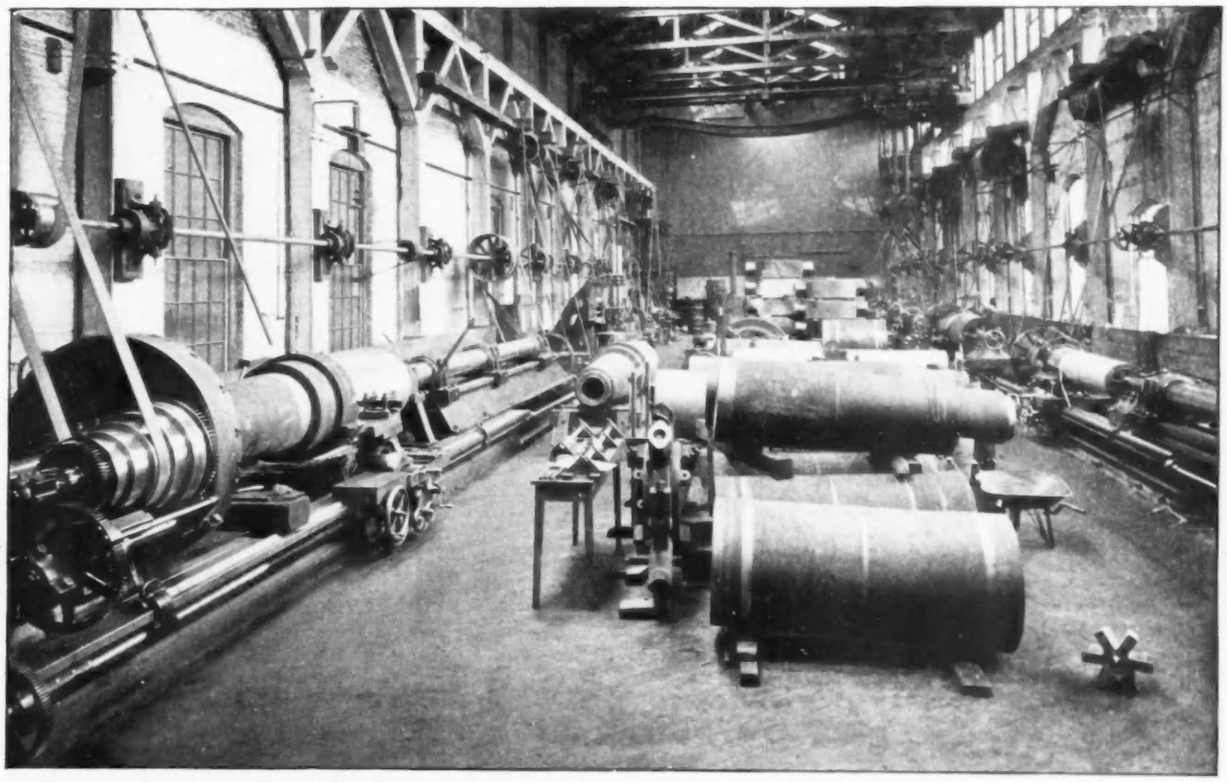


FIG. 22.—TURNING AND BORING PARTS OF BREECH LOADING RIFLED MORTARS. NILES TOOL WORKS.

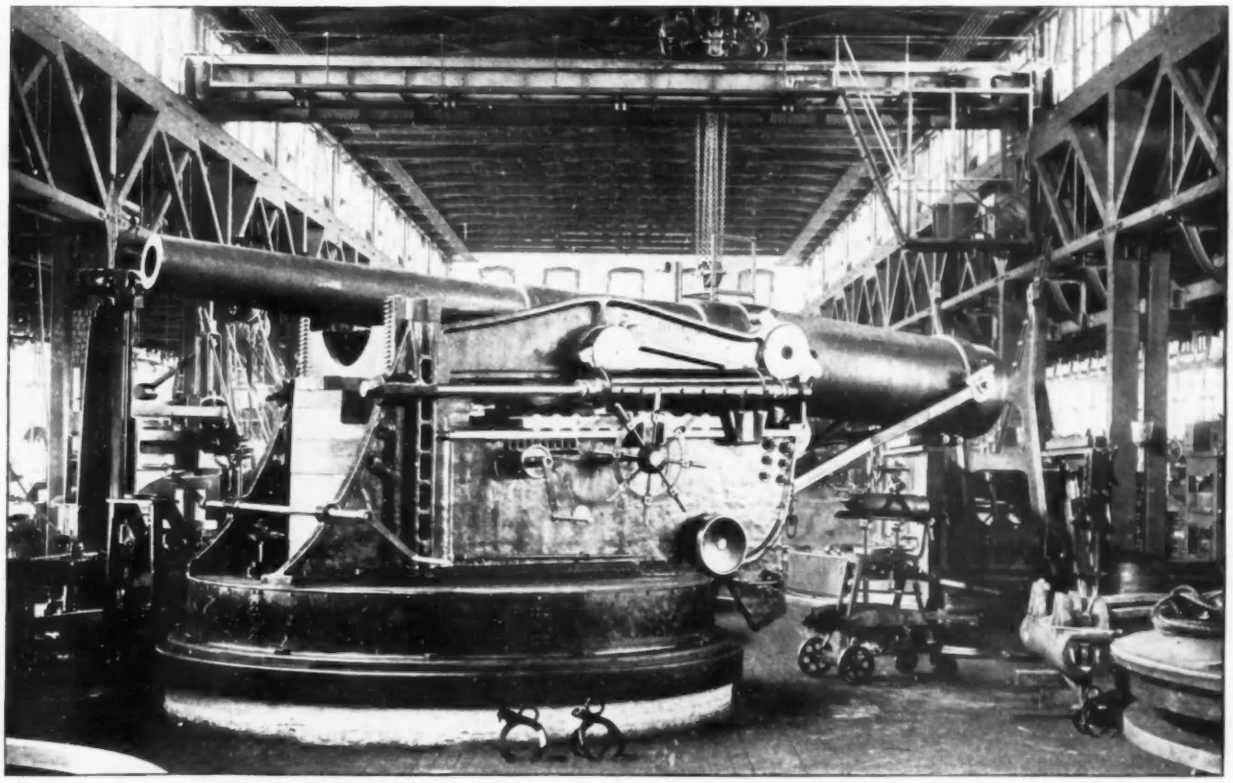


FIG. 23.—AN 8-INCH GUN CARRIAGE ON THE FLOOR OF THE POND MACHINE TOOL COMPANY'S SHOP. GUN IN LOADING POSITION.

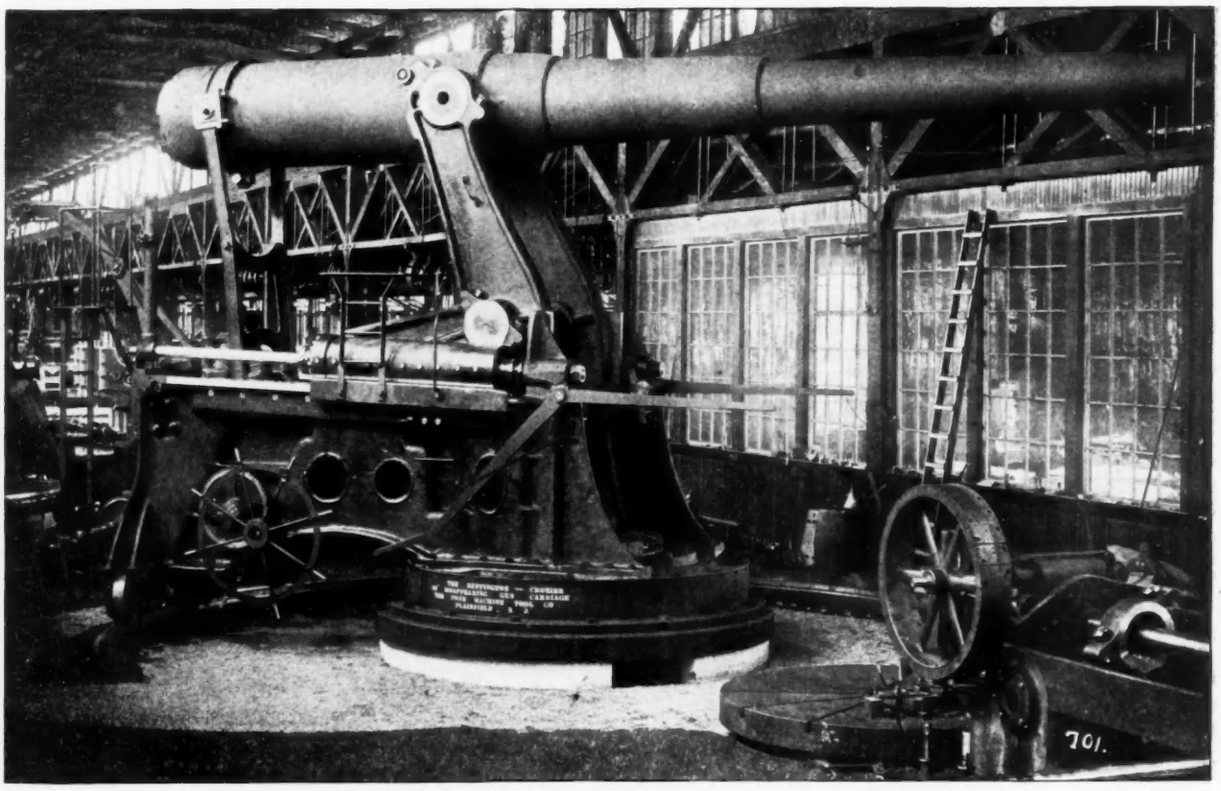


FIG. 24.—A 10-INCH DISAPPEARING GUN CARRIAGE ON THE FLOOR OF THE POND MACHINE TOOL COMPANY'S SHOP. GUN IN FIRING POSITION.

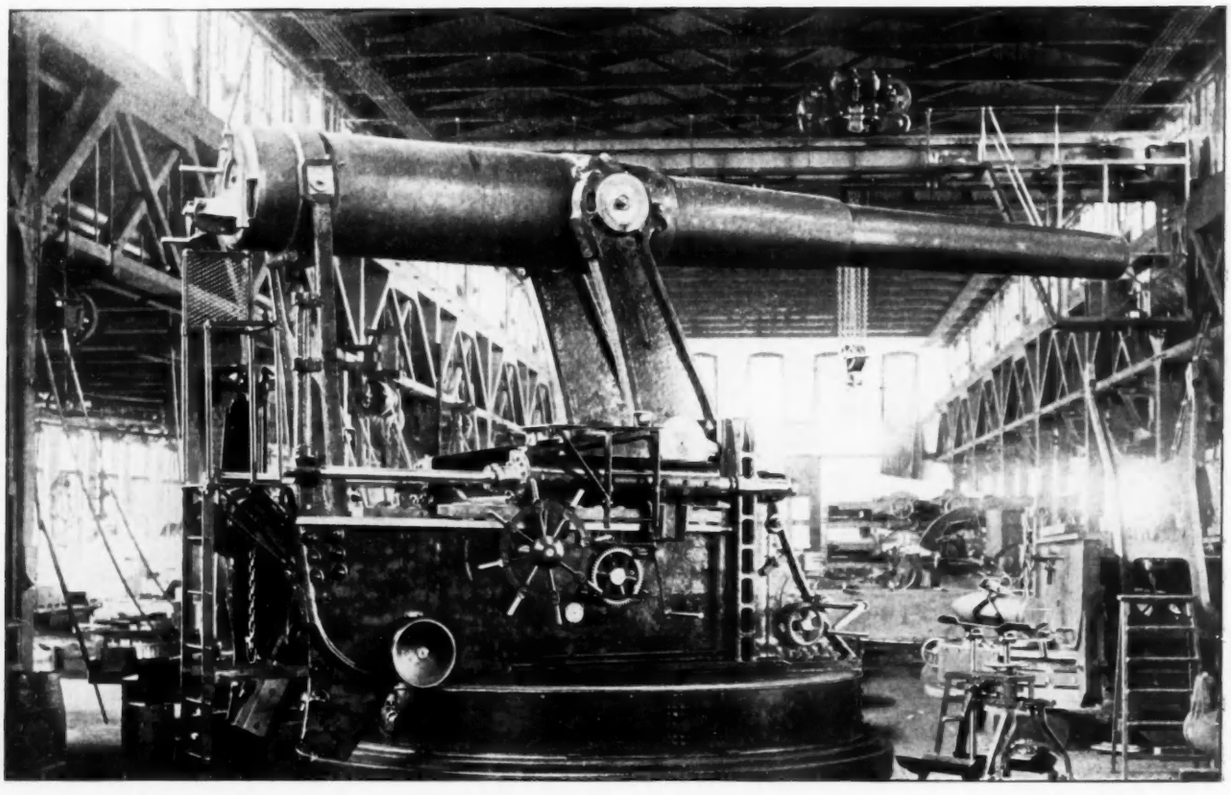


FIG. 25.—AN 8-INCH DISAPPEARING GUN CARRIAGE ON FLOOR OF POND MACHINE TOOL COMPANY'S SHOP. GUN IN FIRING POSITION.

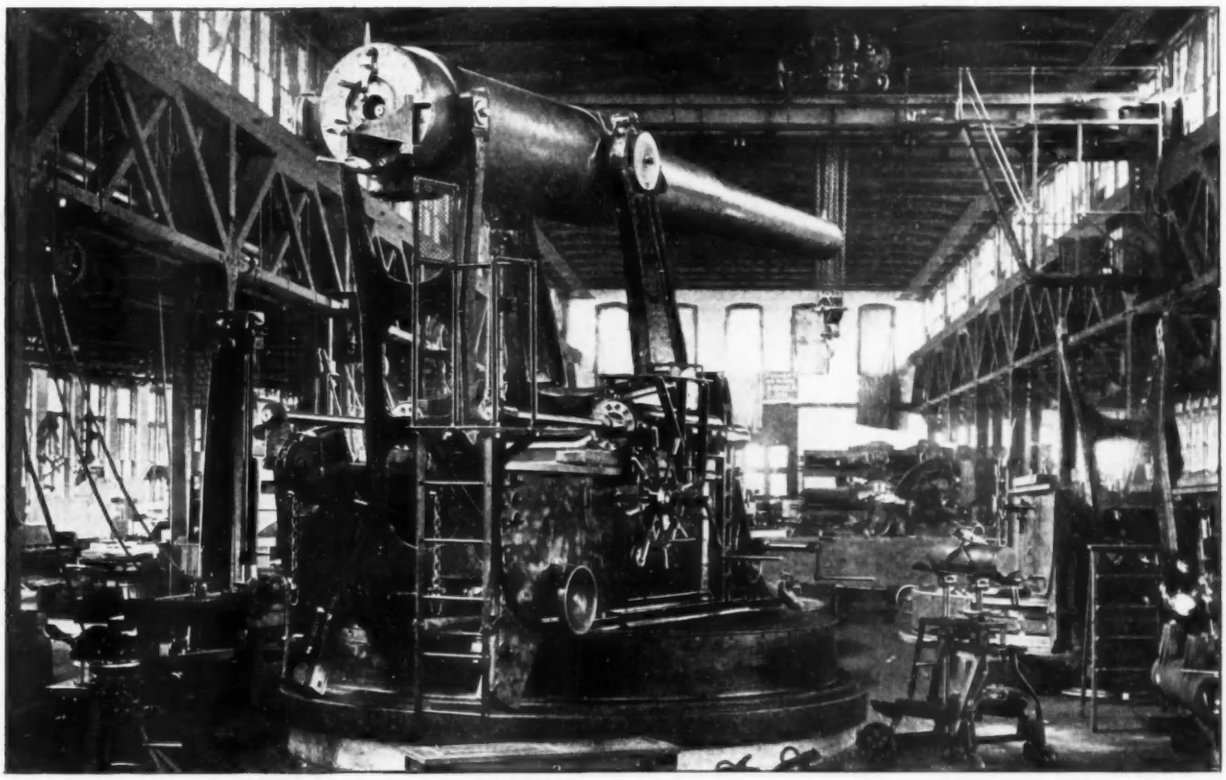


FIG. 26.—AN 8-INCH DISAPPEARING GUN CARRIAGE ON FLOOR OF POND MACHINE TOOL COMPANY'S SHOP. GUN IN FIRING POSITION.

FIG. 27.—EXTERIOR VIEW OF NAVY GUN SHOPS, WASHINGTON NAVY YARD. GUN SHOPS AT RIGHT, POTOMAC RIVER IN BACKGROUND.

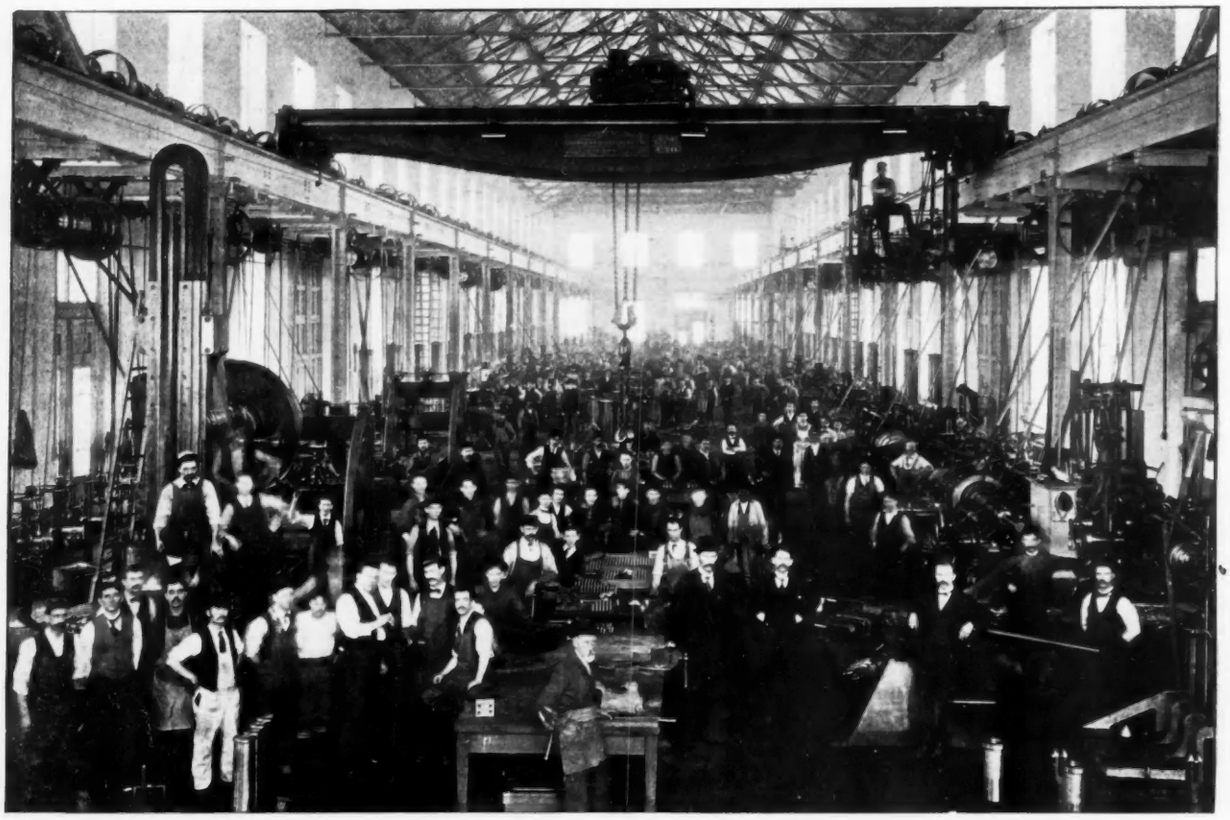


FIG. 28.—GUN CARRIAGE SHOP, WASHINGTON, LOOKING NORTH. ONE OF TWO SHOPS PRACTICALLY ALIKE.

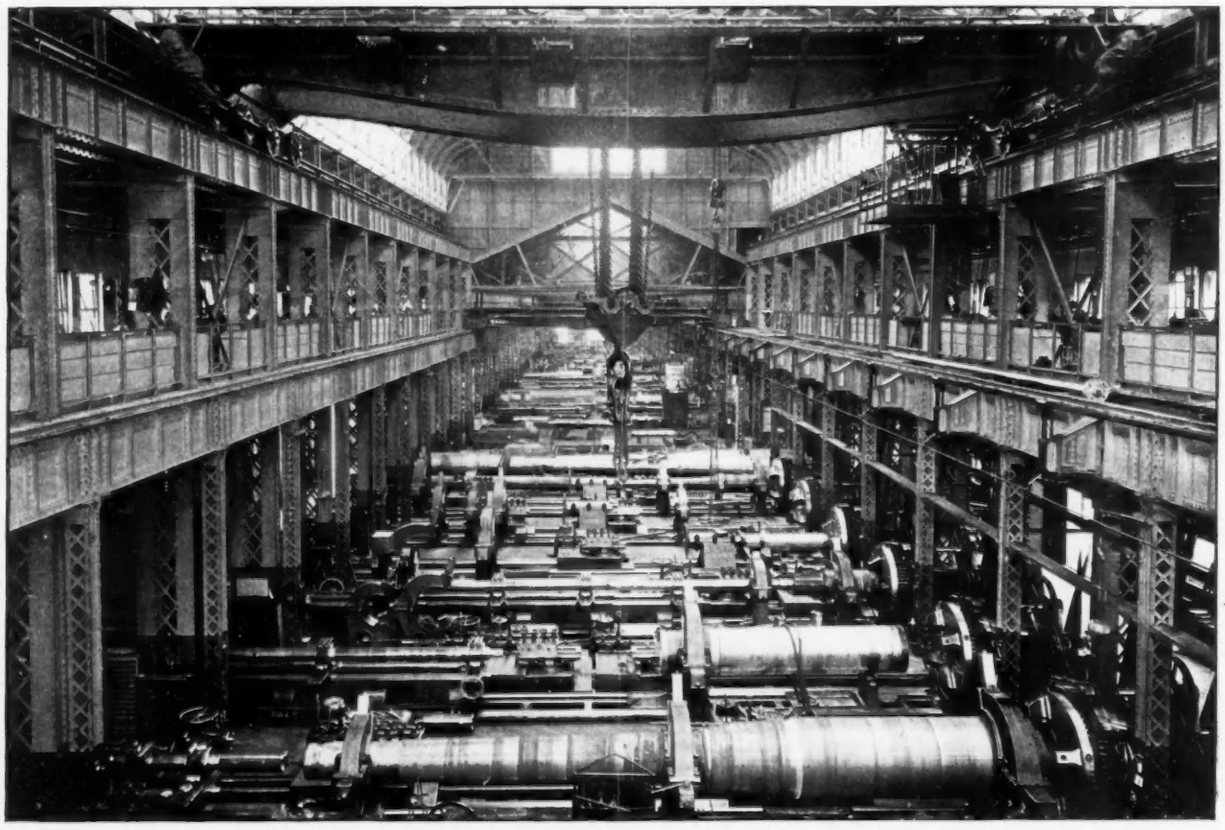


FIG. 29.—INTERIOR OF NAVAL GUN SHOP, WASHINGTON, LOOKING FROM NEW PORTION TOWARD OLD PART. TOTAL LENGTH, 700 FEET. TURNING 13-INCH GUNS IN FOREGROUND.

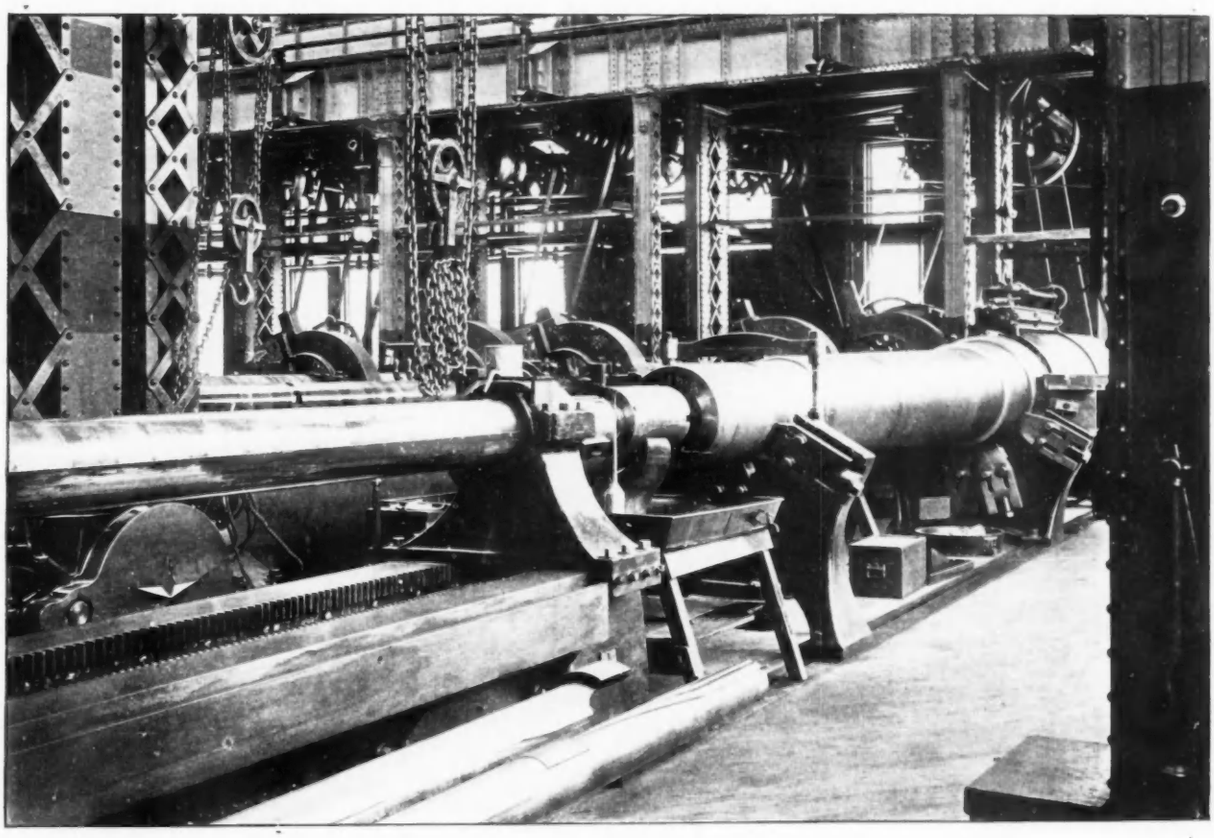


FIG. 30.—RIFLING 13-INCH GUNS, NAVAL GUN SHOPS, WASHINGTON.

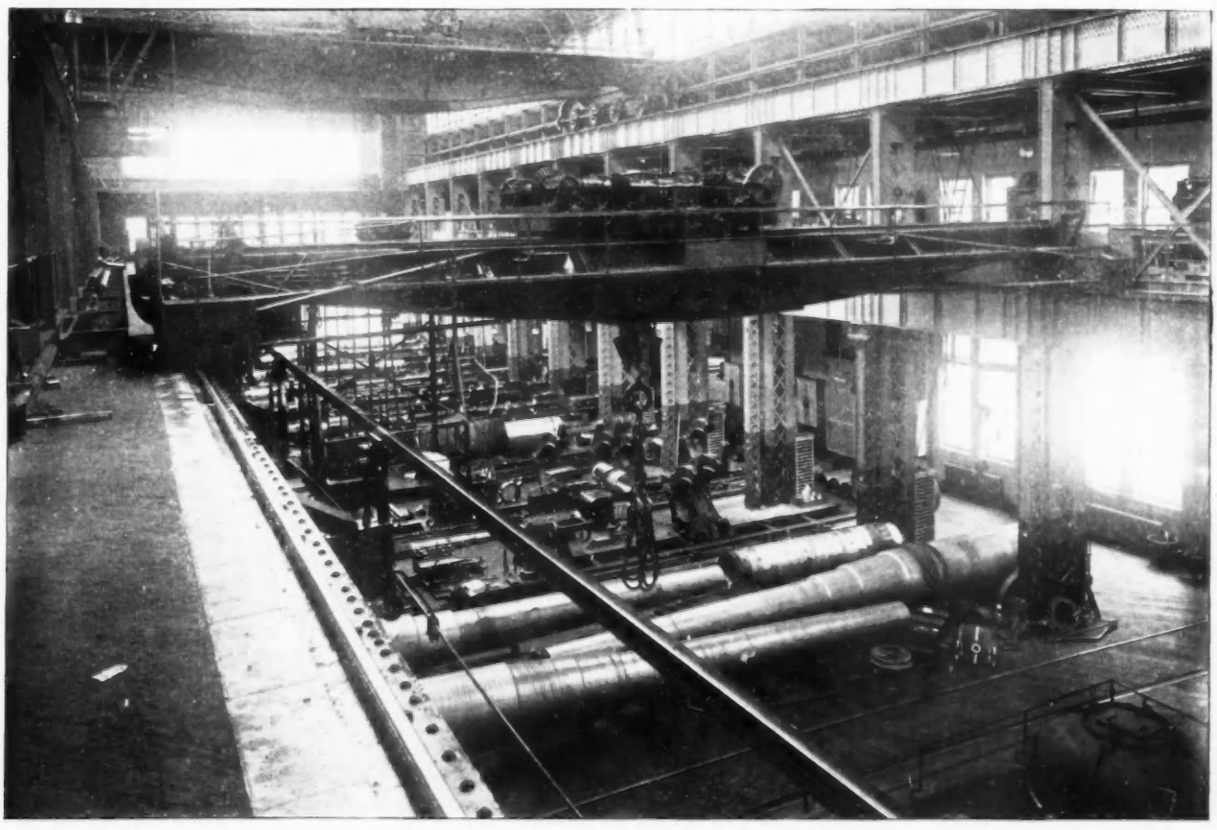


FIG. 31.—NORTH SHOP OR NEW PORTION OF NAVAL GUN SHOP, WASHINGTON. 13-INCH GUNS IN FOREGROUND.

FIG. 32.—LOOKING NORTH IN NAVY GUN SHOP. 4-INCH RIFLE SUSPENDED BY CRANE.

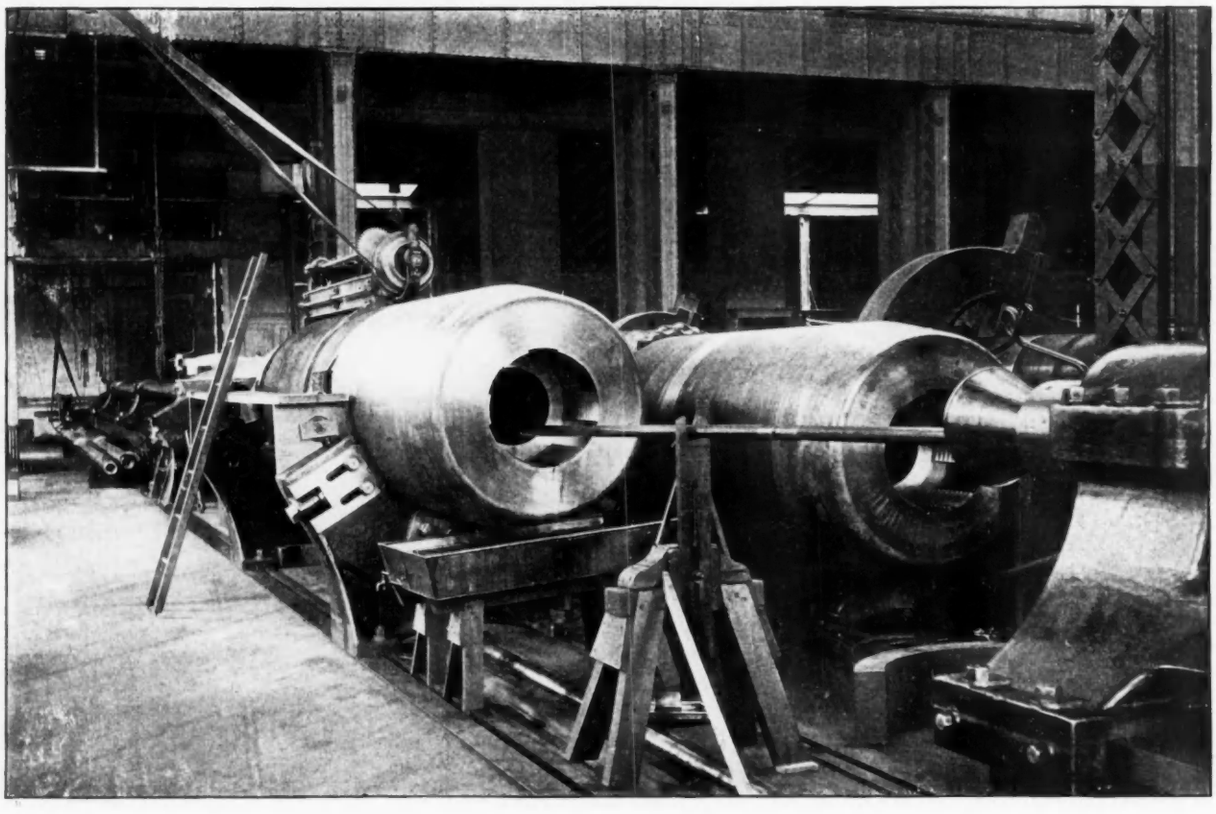


FIG. 33.—GUN IN RIFLING MACHINE. PORTABLE MILLING MACHINE SUPERIMPOSED.

FIG. 34.—SHRINK-PITS. NEW GUN SHOP, WASHINGTON NAVY YARD.

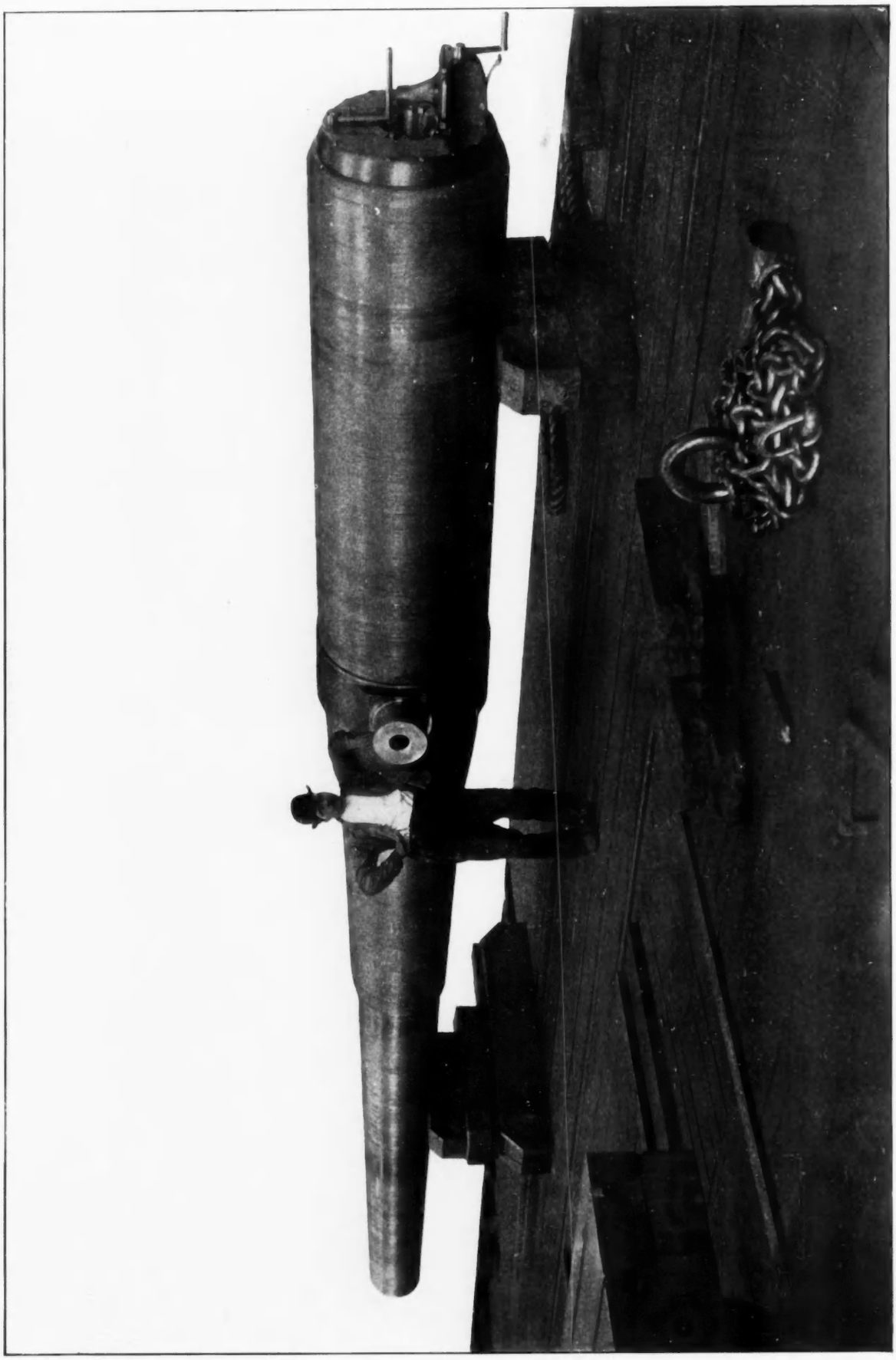


FIG. 35.—10-INCH BREECH LOADING RIFLE. CAST, FORGED AND FINISHED BY THE BETHLEHEM IRON WORKS.
TOTAL LENGTH, 30 FEET 7¼ INCHES. WEIGHT, 67,365 POUNDS.

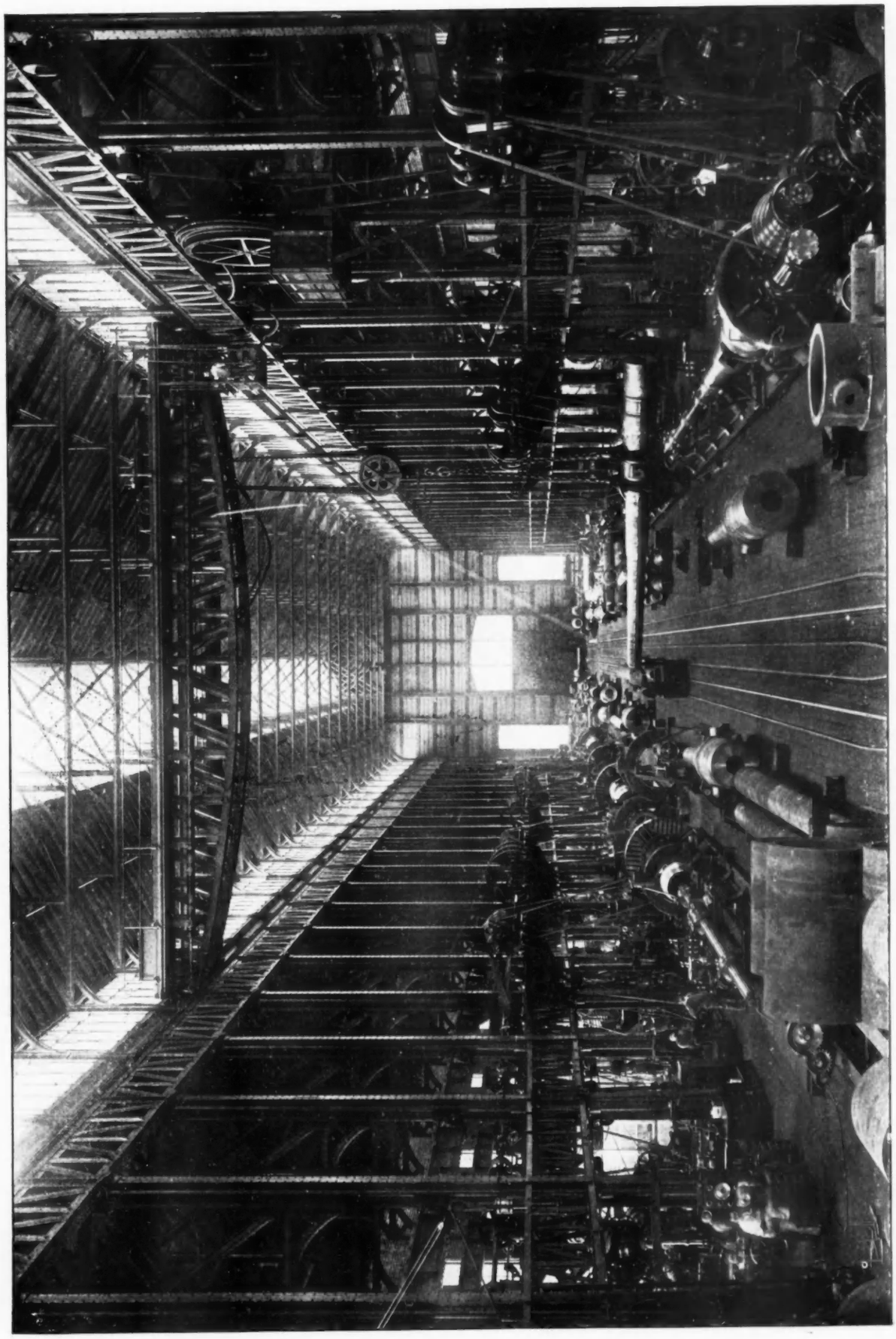


FIG. 36.—GUN FINISHING SHOP OF THE BETHLEHEM IRON WORKS, LOOKING EASTWARD. 16-INCH GUN HANGING IN CRANE. GUNS AND PARTS OF GUNS IN THE TOOLS AND UPON THE FLOOR.

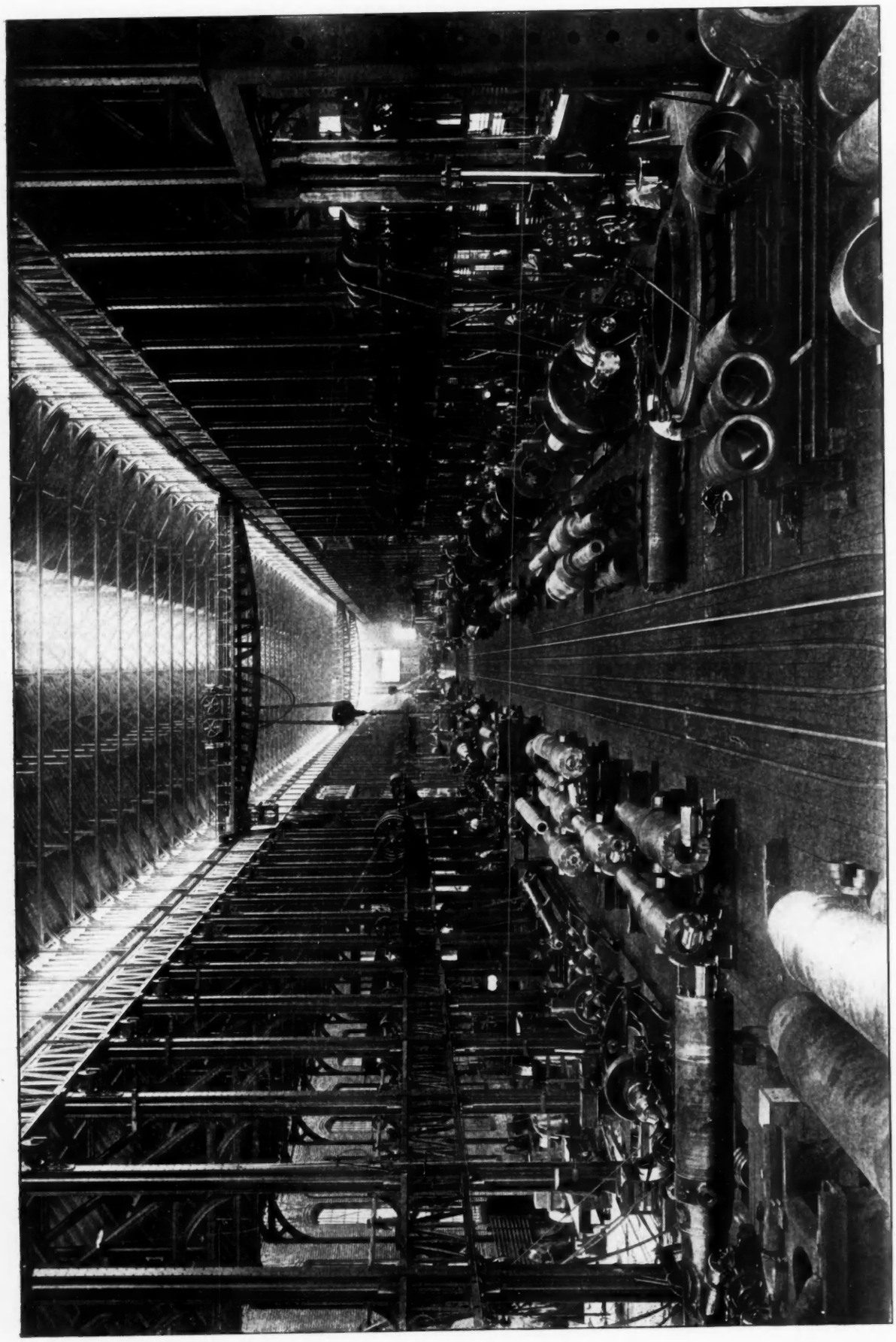


FIG. 37.—GUN FINISHING SHOP OF THE BETHLEHEM IRON WORKS. LOOKING WESTWARD. FINISHED GUNS IN LEFT FOREGROUND.

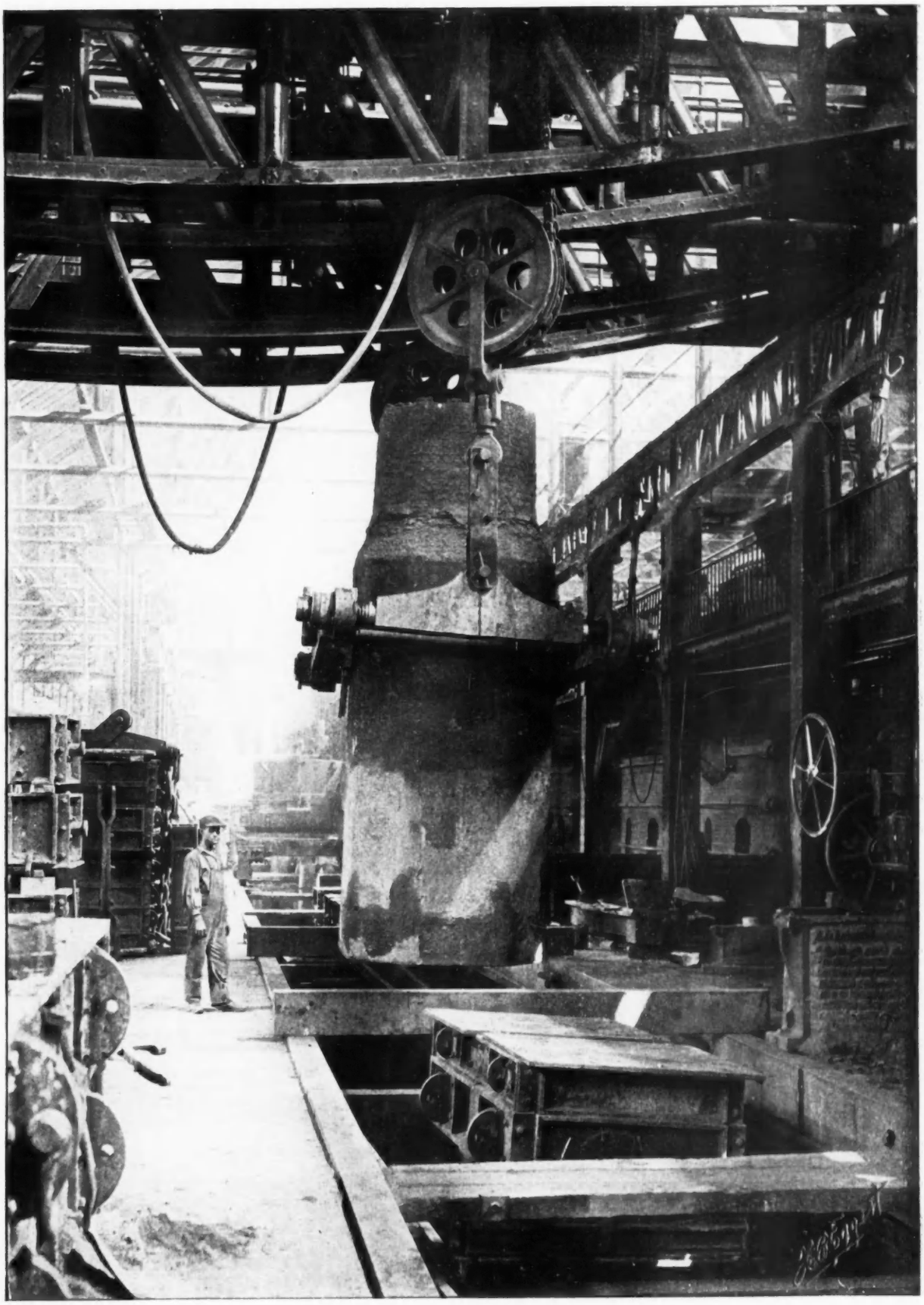


FIG. 38.—NICKEL STEEL INGOT FOR TUBE OF 16-INCH BREECH LOADING RIFLE, JUST LIFTED OUT OF CASTING PIT. WEIGHT OF INGOT 222,300 POUNDS, OR 99.2 GROSS TONS. DIAMETER 74 INCHES. TOTAL HIGHT INCLUDING SINK-HEAD 199 INCHES. STEEL FOUNDRY OF BETHLEHEM IRON WORKS.

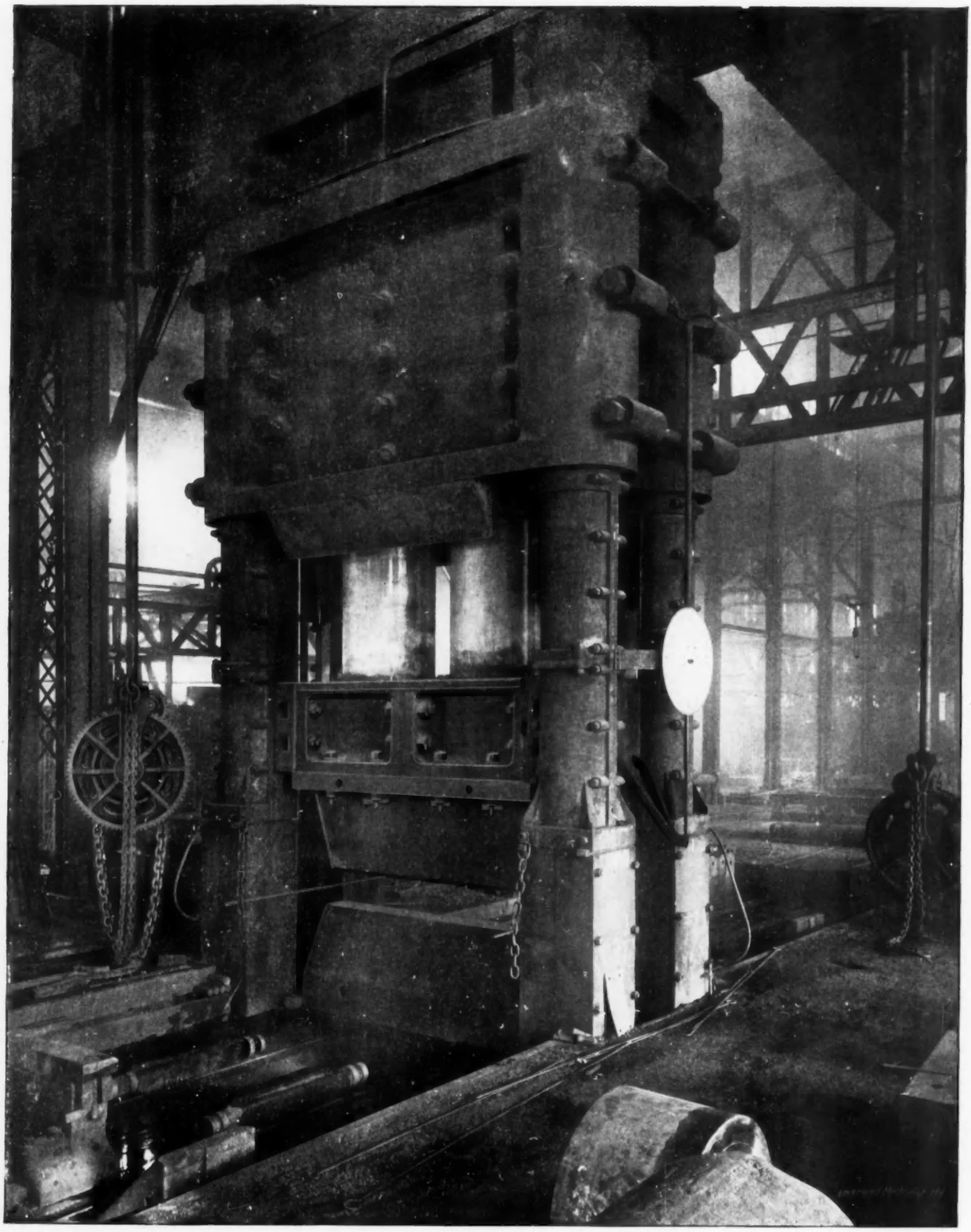


FIG. 39.—HYDRAULIC FORGING PRESS FOR GUNS AND ARMOR. CAPABLE OF EXERTING A PRESSURE OF 14,000 TONS, AND SERVED BY A PUMPING ENGINE OF 15,000 HORSE-POWER. BETHLEHEM IRON WORKS.

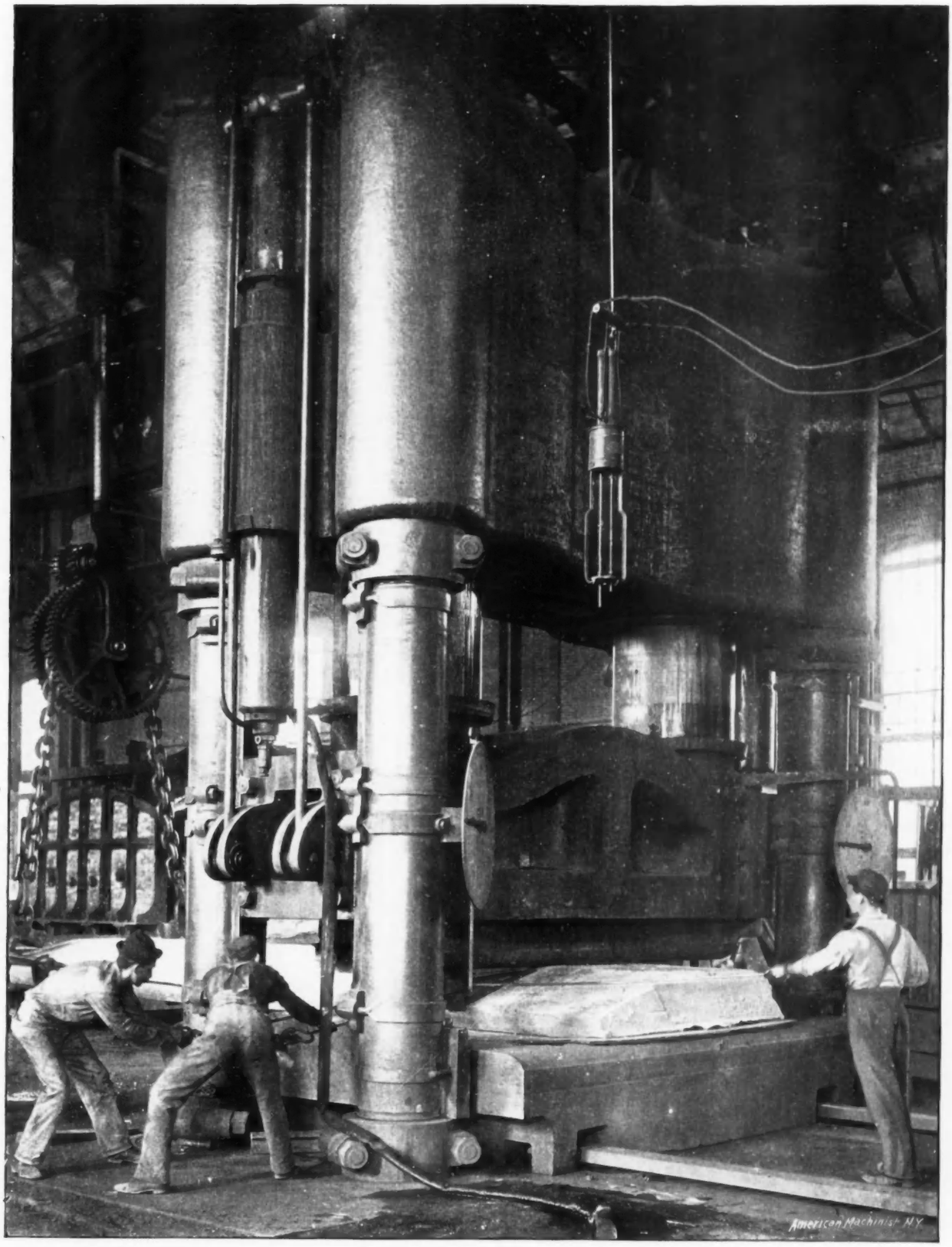


FIG. 40.—BENDING PRESS FOR ARMOR. BENDING A 14-INCH NICKEL STEEL PLATE FOR SIDE ARMOR. CAPACITY OF PRESS 7,000 TONS. BETHLEHEM IRON WORKS.

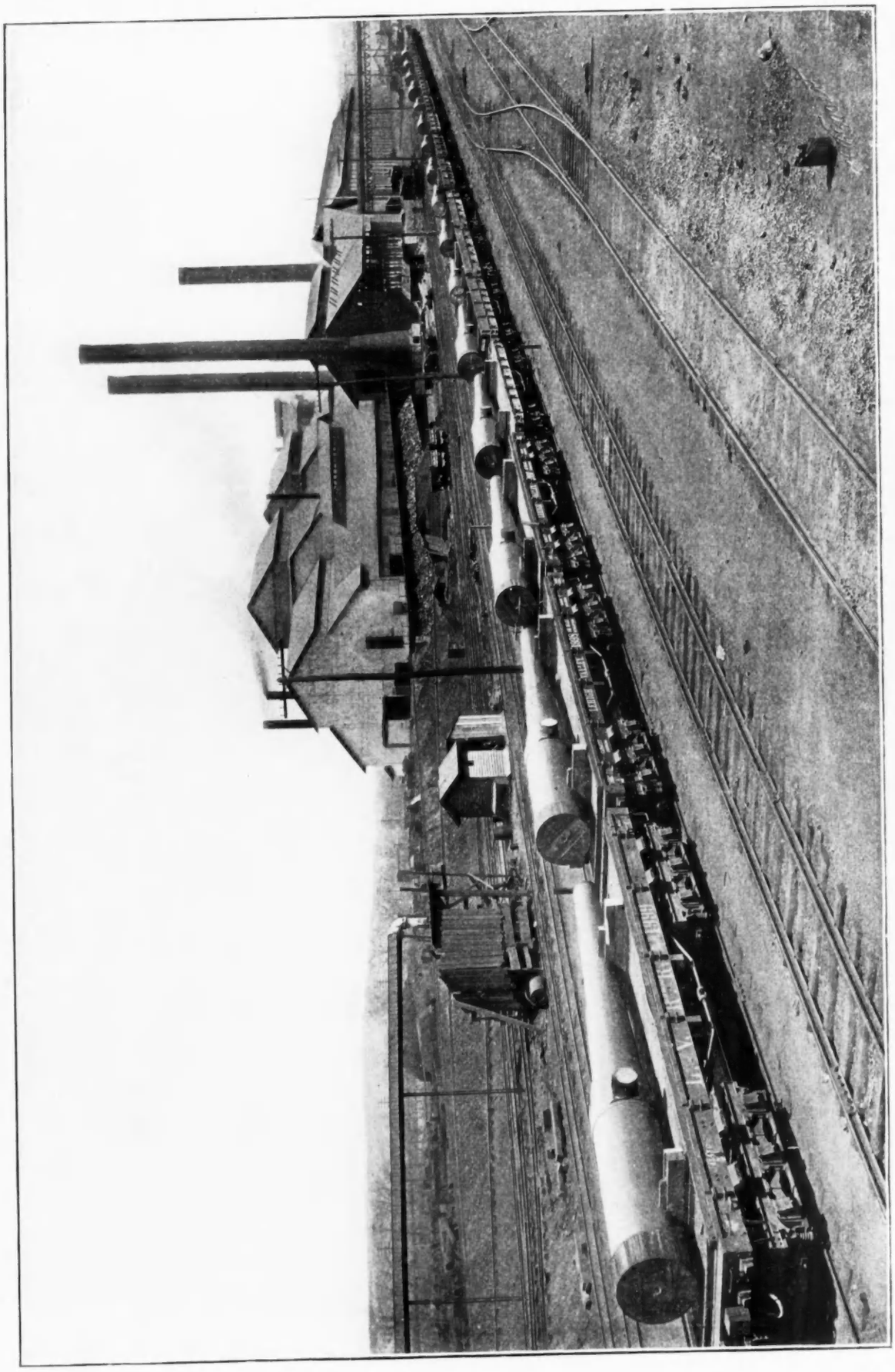


FIG. 41.—PART OF A SHIPMENT OF BREECH LOADING RIFLED GUNS FROM THE BETHLEHEM IRON WORKS. FIFTEEN 8-INCH AND NINE 10-INCH GUNS, WEIGHING RESPECTIVELY 32,354 POUNDS AND 67,365 POUNDS EACH AND FOR THROWING PROJECTILES WEIGHING 300 AND 575 POUNDS EACH, RESPECTIVELY.

two minutes if desired, and experiments have shown that it is exceedingly difficult for an enemy to locate, and still more difficult for him to hit, a gun so mounted. It remains in view only about one second after the discharge, and the smoke soon spreads out and is dissipated.

▲ ▲ ▲

Our Illustrations of Machine Shop Work on War Material.

Not much needs to be said, we take it, in explanation of the engravings we present in this issue. They mostly explain themselves.

The disappearing gun carriage shown on page 1 is described elsewhere. It is a machine which we can all unite in wishing our coast line was made to thoroughly bristle with. There may be honest differences of opinion as to the advisability of our building and maintaining naval vesels designed to carry on war outside our own waters, but there can be no question as to the propriety of our being fully supplied with the efficient means of self-defense illustrated in Figs. 1, 23, 24, 25 and 26.

As most of our readers know, the Builders' Iron Foundry, of Providence, R. I., has been building breech-loading rifled mortars for several years, and has a very complete plant for the purpose, much of the machiney having been specially constructed for or adapted to the work. They have built also many carriages for these mortars. Mortar carriages are much simpler affairs than those we show, being without the disappearing feature. The mortar is placed in a pit and remains there out of sight, the elevation of the muzzle being such as to throw the shell out over the fortifications and to the target. Fig. 3 shows one of the special machines for milling a circular arc (grooved) which forms part of the breech mechanism. The milling spindle is made to travel on an arc of a circle the center of which is the arbor that is fixed in the breech of the gun, as shown. Automatic feed is secured by means of the smaller rope sheave, which rotates a nut on the feed-screw. The end of the feed-screw is squared for a hand crank.

At Fig. 4 are shown two veterans of this shop. The lathe and the lathesman (at the left) have both been in service for thirty-five years. The gun is being turned after shrinking on the first row of hoops.

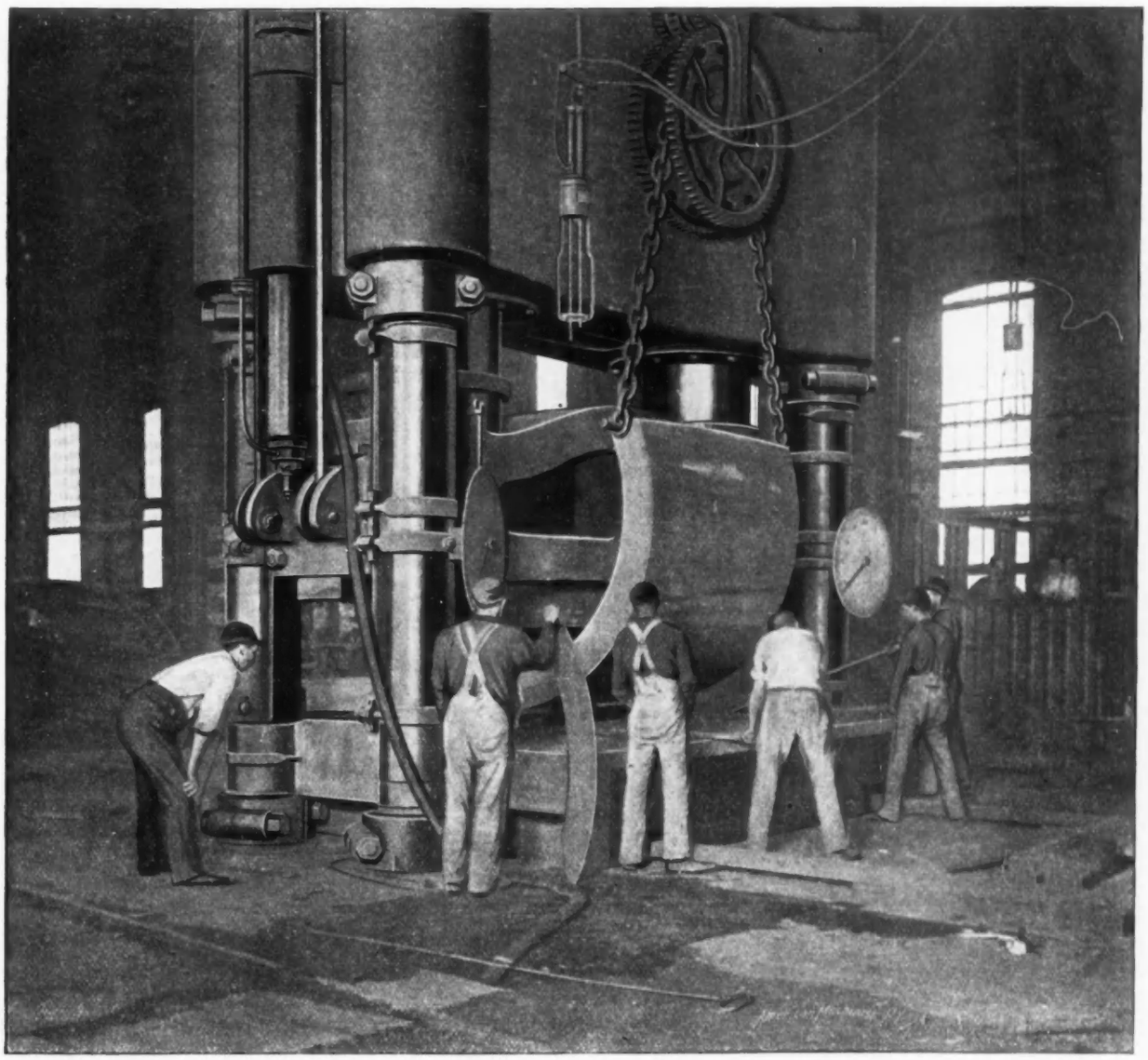


FIG. 42.—HYDRAULIC BENDING PRESS. BENDING 8-INCH NICKEL STEEL TURRET ARMOR. CAPACITY OF PRESS 7,000 TONS. BETHLEHEM IRON WORKS.

In our issue of April 9, 1896, we gave a very full account of the lathe work done on heavy guns at Watervliet Arsenal, West Troy, N. Y. In Figs. 6 to 17, inclusive, we give some additional views of this establishment, which are self-explanatory.

Figs. 18 to 22, inclusive, were taken in the shops of the Niles Tool Works at Hamilton, Ohio. Fig. 18 is a view from the west end of the shop, and shows the pit for the erection of carriages. This shows clearly the "racer" or ring of rollers on which the circular base of the chassis rests. In the foreground is what is called the upper carriage, which is cast in one piece of gun iron, which piece includes the cylinders by which the recoil of the gun is throttled. To this piece the levers which support the gun and counterweights are pivoted.

At Fig. 19 one of the smaller Niles horizontal boring, drilling and milling machines is seen at work drilling holes in the flanges of the base-ring of a disappearing gun carriage. All this drilling is done at one setting of the work, the column of the machine being traversed upon the bed. Immediately back of this machine is the gangway leading from the foundry, this accounting for the bed castings seen there.

Figs. 20 and 22 were taken in the gun shop of the Niles Tool Works. This department is devoted to making breech-loading rifled mortars. At the left of Fig. 22 is seen a special heavy 63 inch lathe, in which a mortar is being turned after five of the pieces composing it have been shrunk together. Two more are put on afterward to complete the piece. This lathe is used also for boring and rifling. Hoops, jackets and trunnion rings are seen on the floor, and, on a small table in front of the lathe, are some Government measuring instruments.

In Fig. 20, which was taken from the opposite end of the same shop, work on breech mechanisms is mainly in view. This shop has a separate electric drive.

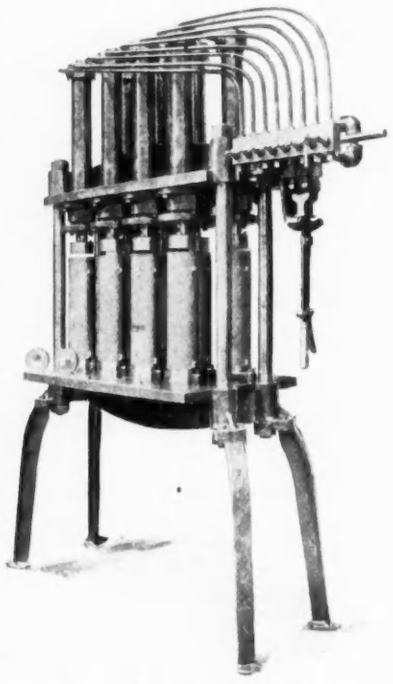
Fig. 21 shows the front portion of the Niles main shop. In the right foreground is a chassis rail and in the background are base rings, two of them in place on the foundations of the erecting pits and one upside down under the arm of a radial drill. In the background is a 10-inch gun sent from Watervliet for testing disappearing gun carriages.

In this figure is seen the headstock for a 90-inch gun lathe, being built for the Midvale Steel Company. The main shop of the Niles Works referred to is 400x101 feet; the one in which Fig. 19 was taken is 327x115 feet; the gun shop is 150x50 feet. The total plant has fifteen acres under cover and employs at present 1,000 men.

Figs. 23 to 26, inclusive, were taken in the shops of the Pond Tool Works, Plainfield, N. J., and show disappearing gun carriages in various positions on the shop floor. No guns or mortars have been made at this establishment, but it is now running night and day on a hurry order for disappearing carriages.

Figs. 27 to 34, inclusive, were taken in the Naval Gun Shop at the Washington Navy Yard. This gun shop is 700 feet long and at present 1,400 men are working there, the ordinary or regular force being about 900. It is in charge of Commander E. C. Pendleton, U. S. N., who organized it and has made an excellent record in gun manufacture. The photographs, with the inscriptions under them, will be readily understood.

Figs. 35 to 42, inclusive, were taken at the Bethlehem Iron Works, South Bethlehem, Pa., where not only the finishing processes on guns are performed, but guns are made from the raw material, the steel being cast into ingots and cooled while under enormous hydraulic pressure,



HYDRAULIC PRESS FOR MOLDING SMOKELESS POWDER.

these ingots being then forged under hydraulic presses. Some of them are forged hollow, *i. e.*, the ingot is bored, a mandrel in inserted and the ingot then forged upon this mandrel, by which processes the very highest quality of metal is obtained.

Fig. 35 gives perhaps the best idea of what a 10-inch gun is like, and the inscriptions beneath the other views sufficiently explain them. They are all especially worthy of attention. The 14,000-ton hydraulic forging press, shown in Fig. 39, is served by a 15,000 horse-power pumping engine, and Fig. 41 is only a little over half of a single shipment of guns from this establishment.

Besides making guns, the Bethlehem Works make forgings for Watervliet Arsenal and for the navy gun shops. Armor plate is also made here, besides large quantities of forgings for private customers. The axle of the Ferris Wheel was made here.

To shop men these pictures tell their own story, and it is an eloquent one.

▲ ▲ ▲

A Smokeless Powder Press.

The press shown in our illustration is one of several types of similar machines designed for the manufacture of smokeless powder, and made by the Watson-Stillman Company, of this city.

Smokeless powder is manufactured into sticks of the caliber needed and cut off the right length to fill cartridges. These sticks contain from one to six holes for the entire length, according to the kind of powder that is used, and these presses are designed to take the powder in a plastic state and press it into sticks for use, and, in shop parlance, are called "squirting presses."

This particular press is an eight cylinder affair, made for the pressing of powder for small calibers. Each of the plungers is 2¼ inches in diameter, with a stroke of 19½ inches. The pressure is 3,000 pounds to the square inch, exerting a total pressure of 12 tons on the material in the cylinders, forcing the same through the die at the bottom into a proper receptacle.

As will be seen the eight cylinders are controlled by one large multi-spindle valve operated by a lever, and each cylinder is provided, in the valve casing, with a separate controlling valve, throttling and governing its speed according to the condition of the materials, or cutting the cylinder out altogether.

Smokeless powder is rather precarious stuff to handle and will not stand very much abuse. This press provides for all emergencies that may arise. The powder may explode in one of these presses without very much damage; it automatically throws up the hydraulic ram.

In each head there is located a vacuum valve and an air valve. The latter is open except when closed by actual contact with material under the ram. If any air gets between the ram and powder, compression heats it and causes an explosion. On the other hand, the too sudden withdrawal of the ram will cause an explosion. Therefore a vacuum valve is provided.

On the sides of the cylinders, top and bottom, will be noticed cast lugs. They are for hooking in bales or handles for carrying the cylinders. The powder is put into the cylinder in a plastic state and kept there until pressed out as needed, the cylinders being taken to the press for this purpose. On the left hand of the table will be seen a die and die holder that go into the heavy plate under the cylinders.

This machine is shown as a specimen

of the work now going on in our machine shops on account of the activity of the War and Navy Departments.

▲ ▲ ▲

Personal.

Lieut. C. P. Shaw, retired, is ordered to the Washington Navy Yard May 2.

Assistant Engineer T. D. Parker, U. S. N., has been ordered to the "Puritan."

Passed Assistant Engineer J. E. Palmer, U. S. N., has been ordered to the "Amphitrite."

Passed Assistant Engineer A. McAllister has been ordered to the New York Navy Yard.

Assistant Engineer H. C. Baughman, U. S. N., has been ordered to the Norfolk Navy Yard.

Assistant Engineer J. T. Smith, U. S. N., has been ordered to the Norfolk Navy Yard.

Assistant Engineer H. E. Rhoades, U. S. N., has been ordered to the New York Navy Yard.

Assistant Engineer W. S. Smith, U. S. N., has been ordered to the Mare Island Navy Yard.

Assistant Engineer J. L. Wood, U. S. N., retired, has been ordered to the Norfolk Navy Yard.

Acting Passed Assistant Engineer Goold H. Bull, U. S. N., has been ordered to the "Prairie."

Assistant Engineer R. E. Carney, U. S. N., retired, has been ordered to the Mare Island Navy Yard.

Passed Assistant Engineer William L. Bailie, U. S. N., has been ordered to the League Island Navy Yard.

Assistant Engineer W. H. P. Creighton, U. S. N., has been ordered to duty with the tug "Mary Wittock."

Chief Engineer R. T. Hall, U. S. N., has been appointed chief engineer, with the relative rank of lieutenant.

Assistant Engineer G. W. Lowe, U. S. N., has been detached from the Naval Academy and ordered to the "Justin."

Chief Engineer C. H. Loring, U. S. N., retired, has been appointed inspector of machinery at the Quintard Iron Works, New York.

Passed Assistant Engineer F. J. Schell, U. S. N., has been detached from the Naval Academy and ordered immediately to the "Badger."

Passed Assistant Engineer R. Crawford, U. S. N., has been appointed assistant inspector of machinery at William Cramp & Sons.

Passed Assistant Engineer L. D. Miner, U. S. N., has been detached from the "San Francisco" and ordered immediately to the "Solace."

Chief Engineer J. H. Chasmar, U. S. N., has been detached from the "Wabash" on the arrival of the "Chatham" at Boston, and ordered to duty in connection with the "Chatham."

Passed Assistant Engineer J. C. Kafer, U. S. N., has been appointed assistant inspector of machinery at the Morgan Iron Works, New York.

We welcome personal items regarding men connected with the machinery business. Kindly contribute what you can to this department.

Chief Engineer D. P. Jones, U. S. N., has been ordered to the works of the Harlan & Hollingsworth Company as inspector of machinery.

Passed Assistant Engineer G. W. Dyson, U. S. N., has been detached from duty with the Fish Commission and ordered immediately to the "San Francisco."

Passed Assistant Engineer G. W. McElroy, U. S. N., has been detached from the works of the Harlan & Hollingsworth Company and ordered to the New York Navy Yard.

Mr. H. M. Norris, who has been with the Bickford Drill & Tool Company, Cincinnati, Ohio, for some time past, has signed a new contract with that company, taking the position of superintending engineer and manager.

James Galabally was running a lathe in the shop of the R. D. Wood Foundry Company, Florence, N. J., when his hand was caught by the chuck and so mangled that amputation was necessary. This is, happily, an accident of rare occurrence, notwithstanding the opportunities which exist in every shop.

▲ ▲ ▲

Obituary.

Robert M. Sanderson, assistant superintendent of the steel plant of the Phœnix Iron Works, died at Phœnixville, Pa., on April 26, forty-five years old.

▲ ▲ ▲

It is announced that the Bessemer Pig-iron Producers' Association has arranged for banking all furnaces for 30 days in order to restrict production.

▲ ▲ ▲

An impact testing machine is being designed for the engineering laboratory of the Massachusetts Institute of Technology. It will resemble a pile driver in general construction, and is to have a 500-pound hammer, with a drop of about 8 feet. It can be used for both transverse and longitudinal tests, so as to indicate the effect of impact in cross breaking and compression. Another machine for which designs are now in hand is intended to show the effect of repeated tensile and compressive stresses, and will have a capacity of 100,000 pounds. The stresses are to alternate between tension and compression at the rate of 60 turns a minute.

Commercial Review.

NEW YORK, Saturday Evening, April 30, 1898.

DYNAMOS AND MOTORS.

It is undeniable that the electrical market suffered somewhat from the anticipation and realization of war, and that its votaries are looking into the future with blank perplexity as to how far it will be affected hereafter. And yet the injury so far has been less than one might suppose. Not only is there a large amount of Government work to compensate for much of the retardation in regular trade, but several of the progressive medium sized concerns which build and sell dynamos and motors for lighting and power purposes generally inform us that there has yet been no appreciable curtailment in their orders received or that such curtailment has been small.

The vital point of trade at which the war excitement chiefly strikes is the financial or capitalization part. Hence new street railway work is particularly under its influence, because of the difficulty of floating bond loans. Electrical power transmission systems are also being retarded. A representative of one of the larger companies told us that he had in mind three such enterprises, evidently important ones, the contracts for which were being withheld because of public lack of confidence.

And in general it may be said that people are not inclined to buy electrical material that they can get along without. In placing their orders they are disposed to call for just what they need at the time being and no more.

But in spite of all this, as we have said before, the electrical business has yet suffered comparatively little from the war scare and the war. This may in part be due to the fact that enterprises for which dynamo and motor orders are now being placed were under headway before the "Maine" disaster.

It is understood that the General Electric and the Westinghouse Companies are doing a large amount of electrical work for the Government. The General Electric Company is preserving some reticence as to the nature and extent of its Governmental business. We are informed, however, that its contracts now on hand, not limited to this, are sufficient to keep it busy for four months, and that its April orders are largely in excess of the estimated amount for the month. Probably a large part of this trade is in supplies and sundries other than dynamos and motors.

An electrical outfit for lighting and power, to be installed in Fort Delaware, near the Delaware River, has been contracted with the C & C Electric Company. Two 40 horse-power Ames engines and a 100 horse-power boiler, also

(*Continued on page 45.*)

AMERICAN MACHINIST

Published Thursdays by

American Machinist Publishing Co.,

256 Broadway, New York.

JOHN A. HILL, President and Treasurer.

C. A. HANSMANN, Sec'y.

Editorial Department.

FRED J. MILLER, Chief.

FRANK RICHARDS,
F. A. HALSEY,
EDWARD P. BUFFET, } Associate Editors.

Illustration Department.

A. L. DONNELL, Chief.

Advertising Department.

C. P. DAY, Eastern Representative.

J. M. WAKEMAN, Western Representative.

Foreign Agents:

R. E. HOWARD,
10 Finsbury Square, London, E. C.,
Representative for Great Britain.

FENWICK FRERES & CO.,
21 Rue Martel, Paris,
Representative for France, Belgium, Switzerland and Italy.

WEEKS & JOHNSON,
Lovedoy St., Johannesburg,
Transvaal Republic,
Representative for South Africa.

Space in advertising pages only is for sale.
We invite correspondence on subjects pertaining to machinery.
Name and address must always be given, though not necessarily published.
Communications for or relating to the reading columns should be addressed to the Editor. All business communications should be addressed to the Company.
Subscribers can have their mailing address changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once. Date on wrappers denotes week with which subscription expires.

Subscription Price:

$3.00 a year in advance, postage prepaid in the United States, Canada and Mexico.

$4.00 a year to other countries, postage prepaid.

Entered at Post Office, New York, as second-class mail matter.

For Sale by Newsdealers, Everywhere.
No back numbers beyond 1897.

▲ ▲ ▲

War and the Machinist.

War is certainly never a desirable thing for its own sake, and is to be avoided whenever possible. But it is sometimes justifiable and even necessary, and it is hard to see how the present one could have been avoided or even long postponed.

We cannot expect Spaniards to take any other than the Spanish view of Cuba and Cuban affairs. Our point of view is necessarily different, and when we consider for how long the Cuban question had been an annoyance and more or less of a menace to us it is clear that a definite settlement of it one way or the other had become a necessity.

The best we can now hope for is that the war will be a short one, that at its end the Cuban question will be forever settled and that our relations with Spain will be such that no further cause for irritation or bad feeling on either side will be likely to arise.

The heaviest burdens of the war will not fall upon those who are now exhibiting their patriotism by giving or selling yachts to the Government, but upon those who have little else but life and limb to give, and who, if they survive, or if they do not survive, then their children, will pay, directly and indirectly, in taxes almost the entire cost of the war. It is safe to say that if these people in both countries had been in control of affairs there would have been no war. Their vital interests are identical, whether they live in America or in Spain. Carlyle has vividly portrayed the essential absurdity and foolishness of such men being raised to be stood up in lines confronting one another and shot; but it is a foolishness which the world has not yet outgrown.

This being the case, we can only rejoice that our highly developed mechanical skill gives us so much decided advantage, and the machine constructor, whether he manages an establishment, bends over a drawing board, operates a machine tool or shoves a file, may congratulate himself that his skill is as indispensable in modern warfare as in peaceful pursuits, and, what is more, that experience gained in the present war may lead to such revision of ideas and plans as to make the machinist still more in demand for preparation for the next war, whenever and wherever it may occur.

It is to be hoped that the time will come when there will be no more wars, but so long as there are to be wars the machinist may console himself with the thought that whatever interference with his business war may cause in some directions is more or less balanced by stimulus imparted to it in others, and that the development of war methods seems likely to call for a still greater proportionate demand for his skilled service.

▲ ▲ ▲

Some Figures.

We cannot go into details regarding the respective capacities of the establishments illustrated in this issue, but we have obtained figures which enable us to present some aggregates that may be interesting. The five works mentioned as making guns and mortars can complete them at such a rate that, supposing a month's production of guns to be discharged simultaneously, the combined weight of all the shots would be 18,871 pounds, and if all of them were to work continuously night and day the combined weight of all the projectiles thrown from guns produced by one month's work would be 37,742 pounds. Assuming a muzzle velocity of 2,000 feet per second, there would be stored in these projectiles 1,173,569,652 and 2,347,139,304 foot pounds, respectively. To get an idea of what this means let us compare it with locomotives.

Suppose a passenger locomotive weighing 100,000 pounds to be traveling 40 miles an hour. Its stored energy, or the number of foot pounds of energy with which it could strike an obstacle, would be $\frac{100{,}000 \times 3445.7}{64.32} = 5{,}349{,}813$ foot pounds. It is thus seen that 219 such locomotives moving at 40 miles per hour would be required to exert the same amount of striking force, and if the shops were working continuously throughout the twenty-four hours the guns they would turn out in one month's time would throw at a single round shots having as much combined stored energy as would be in 438 locomotives, each weighing 100,000 pounds and moving at 40 miles per hour.

A shot from a 13-inch naval gun weighs 1,100 pounds. Assuming a muzzle velocity of 2,000 feet per second, such a shot has stored in it at the moment of discharge 68,407,960 foot pounds of energy, or nearly thirteen times as much as would be in a locomotive when moving 40 miles per hour.

▲ ▲ ▲

Our "Special Number."

This number of the "American Machinist" is larger than usual and considerably more expensive. It is actually a special, *i. e.*, a distinct or singular number. It is not, however, what is commonly known as a "special number." It is unaccompanied by any blowing of trumpets or efforts to secure extra advertising to pay for the extra expense—with a profit. We do not put the cart before the horse by getting up special numbers as a peg to hang extra advertising business upon. This number has been prepared solely to present adequately to our readers some things in which we think they are especially interested at this time. We expect to treat special subjects in a special way when occasion demands it, but the only way in which readers (or advertisers) can be sure of getting the benefit of our "special numbers" is to make use of every number. As the train boy puts it, "There's a prize in every package."

▲ ▲ ▲

In Massachusetts a law has passed the House prohibiting deductions of wages of women and minors employed in manufacturing establishments on account of stoppages of the power.

▲ ▲ ▲

All who are interested in fine mechanical work and like to see people get paid for doing it will regret to hear of the financial troubles of the E. Howard Clock & Watch Company, of Boston, and will hope they will be able to adjust their difficulties and go on.

Continued from page 43.

procured from the Ames Engine Company, will be included in it.

An order for an electrical plant for Fort Washington, on the Potomac, is reported to have been given to a general contracting company, but it is not learned that the sub-contracts have yet been awarded.

Up to about a year ago it was considered necessary to go to the other side of the ocean to obtain searchlight lenses—by which are meant the concave mirrors used to reflect and properly concentrate the light. It is essential that these be without flaw; otherwise the object, as seen in the light, is shadowed at places and deceptive. A firm by the name of Bausch & Lomb is now manufacturing them in this country, and, as we are informed, has received from the Government orders for 200 36-inch lenses.

The Walker Company has received contracts for disappearing gun carriages, in addition to the three already reported, to the value of about $100,000.

For the Brooklyn Navy Yard, some months before the "Maine" disaster, there were ordered of the Siemens & Halske Electric Company of America two 100 kilowatt dynamos for lighting by the three wire system and more especially to furnish power for use in the shops. The machines have not yet been installed, the navy yard authorities having been, we believe, not quite ready for them.

The Siemens & Halske Company is also making a large dynamo and motor installation in a cement works at Northampton, Pa., the dynamo being of 350 kilowatts capacity. It has recently contracted to install elsewhere for mill power transmission two 100 kilowatt generators and ten 15 horse-power slow speed motors.

As regards export trade, we learn that the Watertown Steam Engine Company has taken an order for a complete small electric light plant to go to Vera Cruz. H. B. Coho & Co. also have sold one of about 90 kilowatts for a Southern country.

The Post Office Department, as well as the Army and Navy departments, is cultivating electricity. The Siemens & Halske Company of America is putting two 100 kilowatt direct-connected machines into the Baltimore Post Office. For those at Pittsburg and Louisville have been ordered three 30 kilowatt direct-connected C & C generators.

PITTSBURG REPORT FOR APRIL.

The extensive war preparations in this locality have overshadowed everything in the way of business, which has been left to take care of itself, while all attention is given to the one prevailing topic—war. What effect it will have on business has been and is being discussed freely. Trade is getting quieter, and it seems that everybody is waiting for the next move. Nothing in the way of future wants is considered, consumers only buying what they must have for immediate use.

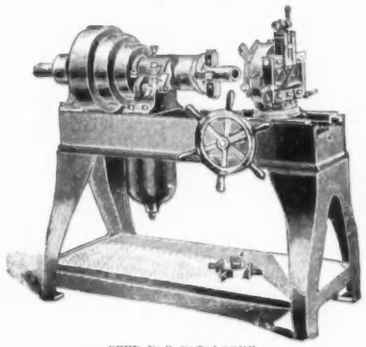
In the raw material market few transactions are recorded. The only feature of the iron market for the past month or so was the action of a number of furnace-owners in the Mahoning and Shenango valleys and the Cleveland district in deciding to curtail production during the coming 90 days. Each operator has decided to remain "banked" one-third of that time, under a forfeiture of $25,000. It is hoped that by closing down for this length of time production will be sufficiently restricted to make prices comparatively easier to hold. No. 1 Foundry Iron is now quoted at $10.75 to $11 cash and No. 2 ranges from $10 to $10.50 cash.

New enterprises are becoming numerous. Within the last three weeks no less than a dozen new companies have been organized in and around this vicinity for the manufacture of iron and steel sheets, engines, etc. These parties will soon be in the market for the necessary equipment, which will serve to make the trade take on a better appearance. The plans for a new chilled roll foundry, to be established at New Kensington, are being prepared. Mr. Albert Cochrane, of Leechburg, Pa., who was founder of the Leechburg Foundry & Machine Company some years ago, is organizing the company.

Continued on page 46

THOROUGH **INSTRUCTION** BY MAIL.
Mechanical Steam Electrical
ENGINEERING.
Mathematics, Mech. Draw., and Machine Design.
Specially Prepared Text Books Free. Payable Cash or Instalments, as low as $2 per month. Write for free Circular T.
THE UNITED CORRESPONDENCE SCHOOLS,
F. W. EWALD, Gen. Mgr. **154-158 Fifth Avenue, New York.**

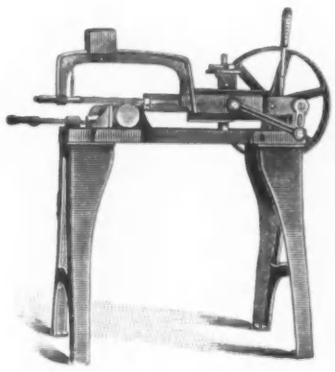
Merrell's
Pipe Threading and Cutting Machines.



SEND FOR CATALOGUE.
THE MERRELL MANUFACTURING CO.,
100 Curtis St., TOLEDO, O., U. S. A.
LONDON, H. Munzing. BRUSSELS, A. Hennuy. LUCERNE, Franz L. Meyer. CHRISTIANIA, C. S. Christensen. PARIS, L. Masson & Co. VIENNA, White, Child & Beney. BREMEN, August Eggers.

"The best is as good as any."

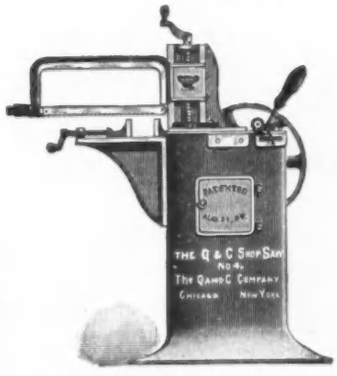
The New
Automatic and Gravity Feed
Q & C Shop Saw



Cuts { Tool Steel, Machinery Steel, Iron, Brass and All Other Metals.

Price—'Way Down.
Quality—'Way Up.

Shop Saws,
Portable Rail Saws,
Cold Power Saws,
For All Purposes.



Send for Catalogue.

Q & C Company,
Chicago. New York.

LONDON: Chas. Churchill & Co.
PARIS: Hounsfield & Fils.
BERLIN: Schuchardt & Schutte.
MADRID: J. G. Neville & Co.

Continued from page 45.

The rolling mill machinery builders are kept rather active, although more orders could be handled. The Frank-Kneeland Machine Company, of this city, recently received a large order for heavy machinery from the Carnegie Steel Company. The Schoen Pressed Steel Company, Allegheny, has lately installed a number of cranes and other machinery furnished by the Chambersburg, Pa., Engineering Company.

Mr. J. A. McCormick, handling the Atlas engine, made in Indianapolis, contracted a short time since to furnish 28 engines, each of 100 horse-power capacity, to the Pittsburg Plate Glass Company. This is one of the largest orders taken in some time.

▲ ▲ ▲

Quotations.

NEW YORK, Monday, May 2.

Iron—American pig, tidewater delivery:

No. 1 foundry, Northern	$11 00 @ 11 50
No. 2 foundry, Northern	10 50 @ 11 00
No. 2 plain, Northern	10 00 @ 10 50
Gray forge, Northern	10 00 @ 10 50
No. 1 foundry, Southern	10 75 @ 11 00
No. 2 foundry, Southern	10 25 @ 10 50
No. 3 foundry, Southern	10 00 @ 10 25
No. 1 soft, Southern	10 75 @ 11 00
No. 2 soft, Southern	10 25 @ 10 50
Foundry forge, Southern	9 75 @ 10 00

Bar Iron—Base—Mill price, in carloads, on dock. Common, 1.07½ @ 1.10c.; refined, 1.15 @ 1.20c. Store prices: Common, 1.25 @ 1.35c.; refined, 1.30 @ 1.50c.

Tool Steel—Base Sizes—Standard quality, 6 @ 7c., with some grades perhaps a little less; extra grades, 11 @ 12c.; special grades, 16c. and upward.

Machinery Steel—Ordinary brands, from store, in small lots, 1.43 @ 1.50c.

Cold Rolled Steel Shafting—Base sizes, from store, 2.15 @ 2.20c., according to quantity.

Copper—Carload lots: Lake Superior ingot, 12¼c.; electrolytic, 11⅞ @ 12c.; casting copper, 11⅜c.

Pig Lead—Carload lots, 3.72½ @ 3.75c., f. o. b. New York.

Pig Tin—For 5 and 10 ton lots, 14¾c.

Spelter—Carload lots, 4.20 @ 4.30c., New York delivery.

Antimony—Cookson's, 8¾c.; Hallett's, 8c.

Lard Oil—Prime city, present make, 49 @ 50c. in wholesale lots for a good brand.

▲ ▲ ▲

Business Specials.

Gear wheels, gear cutting. Grant; see page 18.

Forming Lathes. Mer. Mach. Tool Co., Meriden, Conn.

Selden Packing for stuffing box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., N. Y.

Cutters, reamers and small tools, regular and special; vertical millers, cutter and surface grinders, shears and punches. R. M. Clough, Tolland, Conn.

Situations Wanted.

Experienced mech'l draftsman. Box 7, AM. MACH.

Mechanical dr'ftsman wishes pos. Box 14, AM. MACH.

Draftsman, mech., desires position; tech. graduate; experienced gen. mach'st; ref. A1. Box 6, AM. MACH.

Experienced mechanical d'ftsman, tech. graduate, references, desires position. Box 10, AM. MACHINIST.

Machine designer wishes to change; eight years in charge of work; moderate salary. Box 12, AM. MACH.

Gen. mach. desires pos. as foreman; mast. mech. or eng.; wide exp.; reliable; efficient. Box 226, AM. MACH.

Wanted—A position as supt. mch. works, by a first-class M. E.; best ref. Address Box 230, AM. MACHINIST.

Wanted—Position to represent as resident agent or travel by party widely and favorably known by users of machine tools in U. S. Box 19, AM. MACHINIST.

First-class foreman pattern maker wants situation; thoroughly experienced; highest references; can go anywhere. Address Box 13, AMERICAN MACHINIST.

A shop superintendent of one of the most successful turret lathe builders desires a change; nine years in present position; best ref. Box 229, AM. MACHINIST.

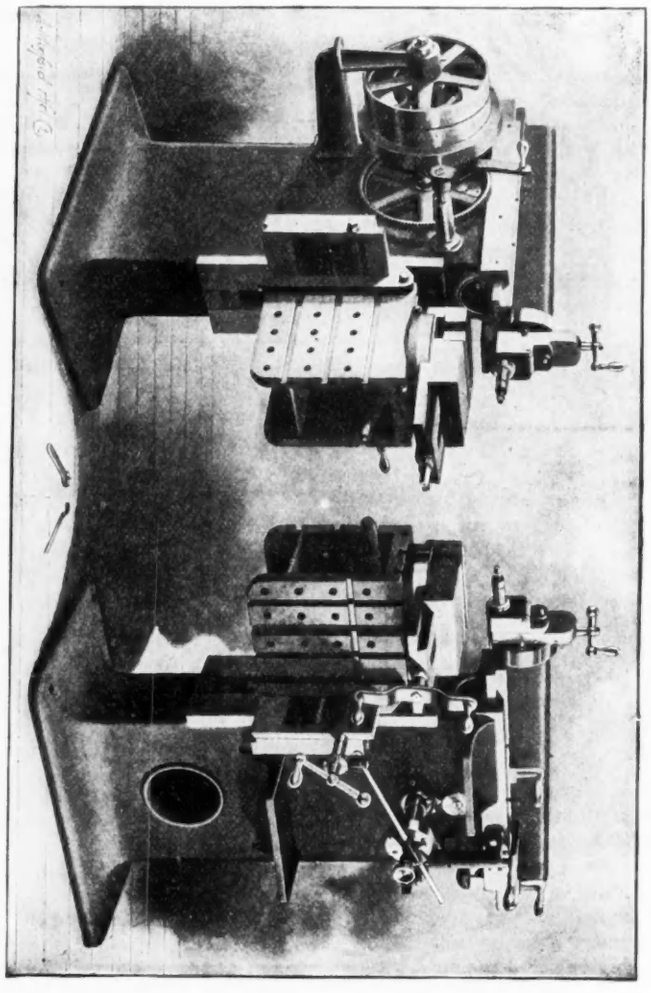
If you want an experienced, systematic, up-to-date gen. foreman or shop supt., who understands his business and attends to it, address Box 231, AM. MACHINIST.

Wanted—Position as foreman in shop or mfg. co., by first-class tool maker and dr'sman; can design all small tools; 10 yrs'. exp. as foreman. Box 4, AM. MACH.

Wanted—One first-class blacksmith for machinery forging, both heavy and light; to a first-class man steady work and good wages will be paid. Address Box 8, AMERICAN MACHINIST.

15-inch Pillar Shaper.

A FRICTION driven machine, fitted with a positive locking device for friction, insuring a uniform length of stroke under a heavy cut. Stroke can be changed to any position with ram in motion; has quick return; and our micrometer adjustment makes possible the most minute variation in length of stroke, which can be constantly varied with machine in motion; an especially valuable feature in tool and die work and in planing to irregular lines.



THE HENDEY MACHINE CO.,

Torrington, Conn.

AGENTS FOR THE PACIFIC COAST:

PACIFIC TOOL AND SUPPLY CO., ... San Francisco, Cal.
J. W. CREGAR, ... Philadelphia Bourse Exhibition.

EUROPEAN AGENTS:

SCHUCHARDT & SCHUTTE, Berlin, Vienna, Brussels, Stockholm.
CHAS. CHURCHILL & CO., Ltd., London and Birmingham, England.
ADOLPHE JANSSENS, ... Paris, France.

A Few of the MODERN SECOND-HAND TOOLS in first-class order lately secured.

ENGINE LATHES.

13 in. x 6 ft. Ames, 15-16 hole, "screw cutting reverse"
14 in. x 6 ft. Flather, taper att., cross feed and ck.
16 in. x 6 ft. Flather, 1 1-16 hole, cross feed and ck.
16 in. x 6 ft. Perkins, 1 1-8 hole, cross fd, R.F.rest.
18 in. x 6 ft. Bradford, 1 1-4 hole, cross fd. and ck.
18 in. x 8 ft. Flather, cpd. rest and cross feed.
19 in. x 10 ft. Lodge-Davis, cpd. rest and taper att.
20 in. x 10 ft. Putnam, cpd. rest and cross feed.
21 in. x 9 ft. Lodge-Davis, cpd. rest and taper att.
22 in. x 10 ft. Fifield, cpd. rest and cross feed.
23 in. x 10 ft. New Haven, late pat., cpd. rest, etc.
24 in. x 12 ft. Putnam, cpd. rest and cross feed.
24 in. x 23 ft. D. W. Pond, raising blocks 32 in., cpd. rest, etc.
32 in. x 18 ft. Fay & Scott, late pat., cpd. rest, etc.
40 in. x 14 ft. Fitchburg, cpd. rest and cross feed.
58 in. x 12 ft. Gage, cpd. rest, cross feed, 54 in. ck.
90 in. x 30 ft. Ames, triple geared, cpd. rest.

PLANERS.

16 in. x 16 in. x 4 ft. Hendey, shifting belt.
24 in. x 24 in. x 5 ft. L. W. Pond Machine Tool Co., latest pattern.
26 in. x 26 in. x 5 ft. Pond Machine Tool Co., latest, extra heavy.
26 in. x 26 in. x 8 ft. Ferris & Miles.
30 in. x 26 in. x 9 ft. Rochester.
30 in. x 30 in. x 14 ft. G. A. Gray Co.
32 in. x 32 in. x 8 ft. D. W. Pond, two heads.
36 in. x 36 in. x 8 ft. Bement.
36 in. x 36 in. x 24 ft. Sellers, extra side head.
38 in. x 42 in. x 10 ft. Pond.
48 in. x 48 in. x 16 ft. Putnam Machine Co.

SHAPERS.

8 in. stroke Gould crank motion.
14 in. stroke Fitchburg, traveling head.
15 in. stroke Hendey, improved style.
16 in. stroke Prentiss, friction.
24 in. stroke Hendey, friction.

DRILLS.

20 in. swing Prentice, wheel and lever feeds.
21 in. swing Prentice, back gears, hand feed.
25 in. swing Lodge-Shipley, back gears, auto. fd.
28 in. swing Aurora, back gears, auto. feed.
30 in. swing Prentice, back gears, auto. feed.

UNIVERSAL MILLERS.

Cincinnati No. 1 1-2, back gears, arm and att's.
Cincinnati No. 3, back gears, arm and att's.
Cincinnati No. 4, back gears, arm and att's.
Brown & Sharpe No. 1, with attachments.
Brainerd No. 15, arm and att's.

SCREW MACHINES—(Wire Feed).

9-16 in. Jones & Lamson.
23-32 in. Bardons & Oliver No. 2.
1 5-32 in. Bardons & Oliver No. 3.
1 5-16 in. Jones & Lamson 7 x, with tools.
2 1-8 in. Jones & Lamson 8 x, all atts. and tools.

MISCELLANEOUS.

Presses—Stiles No. 2-4; Bliss No. 19-20.
Universal Grinder No. 1, Diamond Co's.
Boring and Turning Mill, 40 in. swing.
Floor Boring and Drilling Machine, large size.
Cutting-off Machines, 2 and 3 in.
Boiler Rolls, Punches, Shears, etc.

J. J. McCABE, 14 Dey St., New York.
Philadelphia Branch, The Bourse.

MACHINISTS.

For Sale—Machine shop, with capacity of twelve to fifteen men. Suitable for general machine work or manufacturing machinery. Tools new and of the best makes. A fine chance for two or more machinists with small capital. Satisfactory reasons for selling. Correspondence or personal interview solicited. For detailed information address

F. W. Luscomb Machine Co.,
New Bedford, Mass.

U. BAIRD MACHINERY CO.,

523-525 Water St.; 524-526 First Ave.,
PITTSBURGH, PA.

MACHINE TOOLS.

SECOND-HAND TOOLS.

No. 1. 36 in. x 28 ft. Betts Engine Lathe.
No. 2. 36 in. x 14 ft. New Haven Engine Lathe.
No. 3. 32 in. x 16 ft. Phillips Engine Lathe.
Five 24 in. Lathes.
No. 9. 16 in. x 5 ft. Ballard Lathe.
No. 16. 21 in. x 7 ft. Lodge & Davis Turret Lathe.
Three 13 in. Garvin Turret Lathes.
No. 17. 15 in. x 5 ft. A. T. & M. Co. Fox Turret Lathe.
No. 28. 48 in. Alfred Box & Co. Radial Drill.
No. 40. 36 in. A. & E. Spur Gear Cutter.
No. 44. No. 2 Brainerd Milling Machine.
No. 48. 19 in. Putnam Slotter.
No. 52. 10 in. New Haven Slotter.
No. 45. "D" Newark Horizontal Boring and Drilling Machine.
Planers, Presses, Screw Machines, &c.

☞ WRITE FOR SECOND-HAND LIST.

SECOND-HAND MACHINERY.

ENGINE LATHES.

1 11 in. x 4 ft. Mann.
1 14 in. x 3 ft. 6 in. Putnam.
1 14 in. x 3 ft. 6 in Prentice.
1 15 in. x 6 ft. Starr.
1 15 in. x 6 ft. W. & L.
1 16 in. x 7 ft. D. & H.
1 18 in. x 8 ft. D. & H.
1 27 in. x 10 ft. D. & H.
1 32 in. x 13 ft. Bement.
1 48 in. x 18 ft. G. & S.
1 48 in. x 16 ft. Fifield.

PLANERS.

2 16 in. x 16 in. x 4 ft. Hendey.
1 24 in. x 24 in. x 6 ft. Powell.
1 28 in. x 28 in. x 8 ft. G. & S.
1 30 in. x 30 in. x 8 ft. S. & S.
1 30 in. x 30 in. x 10 ft. Niles.
1 32 in. x 26 in. x 12 ft. Gray.
1 36 in. x 36 in. x 12 ft. Powell.
1 36 in. x 36 in. x 18 ft. Sellers.
1 54 in. x 54 in. x 20 ft. Niles.

SHAPERS.

1 9 in. traveling head, Wm. Sellers.
1 13 in. Traveling Head, Bement.
1 16 in. G. & E., triple G.
1 16 in. G. & E., single G.

DRILLS.

1 34 in. Harris, Bk. G.
1 32 in. L. & D.
1 3 spindle Hendey.
1 No. 3 4-spindle Garvin.
1 6-spindle Quint.
4 Suspensions, Pond.

SCREW & CHUCKING MACHINES.

1 No. 2 P. & W., plain.
1 No. 1 Costello, wire feed.
1 No. 2 Costello, wire feed.
1 No. 2 1-2 P. & W., wire fd.
1 No. 4 Windsor, plain.
1 No. 4 Windsor, wire feed.
1 No. 2 Niles.
1 18 in. P. & W. Chucking Machine.

MISCELLANEOUS.

1 P. & W. Grant Pattern Miller.
1 48 in. Niles C. W. Borer.
1 48 in Industrial C. W. Borer.
1 72 in. Niles B. & T. Mill.
1 3 ft. Riveter, "Portable."
1 No. 2 P. & A. Cyl. Borer.
1 10 in. New Haven Slotter.

Send for New List. Prices on Application.

THE NILES TOOL WORKS CO.,
138 Liberty Street, New York City.

Send 50 Cents in Stamps for Copy of

MACHINE SHOP ARITHMETIC,

American Machinist Pub. Co.,
256 BROADWAY.

BARGAINS IN

NEW AND SECOND-HAND MACHINERY.

Lathes, from 12" to 48"; Planers, from 20" up to 60, 48", 54" and 60" Radial Drills; No. 2 Newton Milling Machine; No. 2 Screw Machine; Shapers, from 6" to 30", Boilermakers' Punches, Shears, Edge Planers, Rolls, Drills, Engines, Boilers, Pumps and Dynamos.

FRANK TOOMEY, 131 N. THIRD ST., PHILA.

We Have in Stock

four 16 inch x 6 feet engine lathes made by F. E. Reed & Co., with master screws, raise and fall tool rests and taper attachments, used short time but good as new. Price each, $285. Also large stock of other second-hand machinery, modern and in good condition.

J. B. DOAN & CO.,
68-70 South Canal Street, Chicago.

Almost New Machine Tools

—AT—

SECOND-HAND PRICES.

1 English Slotter, 14 in. stroke.
1 Universal Radial Drill, 5 ft. arm.
1 No. 1 Betts Horizontal Boring Machine.
1 63-in. Pond Vertical Boring Mill.
1 6-ton Double-Acting Steam Hammer.
1 6-ton Single-Acting Steam Hammer.
1 2-ton Double-Acting Steam Hammer.
1 2500-lb. Double-Acting Steam Hammer.
1 Helve Hammer.
1 No. 7 Hilles & Jones Shear.
1 Morgan Electric Crane, 15 tons.
3 Dynamos.

HILL, CLARKE & CO.

156 Oliver Street, BOSTON, MASS. | 12 South Canal Street, CHICAGO, ILL.

IMPROVED 16" & 18" ENGINE LATHES

RAHN & MAYER
216 W. Pearl St.,
CINCINNATI,
OHIO, U. S. A.

FOR SALE—CAN SHIP AT ONCE.

New Metal Planer, 129 in. x 72 in. x 37 ft.

Two heads on rail; one head on each housing.

THE POWELL PLANER CO.,
WORCESTER, MASS.

THE BRADFORD BELTING CO.

CINCINNATI, OHIO, U. S. A.

"MONARCH" RIVETLESS LEATHER BELTING.

Write for Catalog "A."

"A Tome That Tells of Tools"

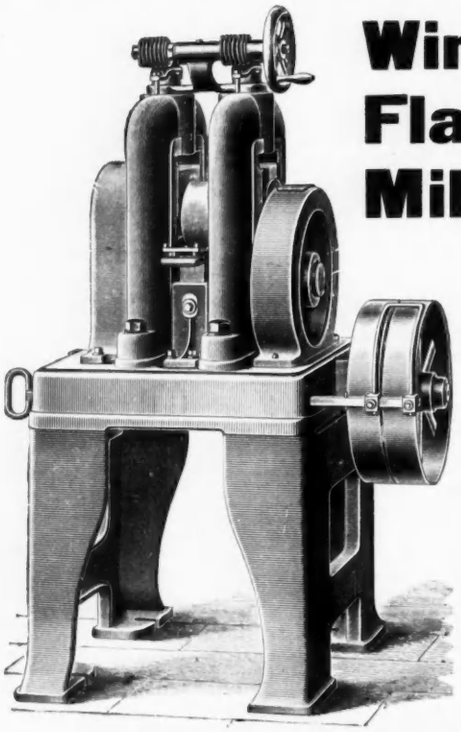
All about every known Tool, large and small, and its uses, size, weight and present market price. Every Tool described and illustrated by fine and accurate cuts. Sent at once for **MONTGOMERY & CO.'S** thoroughly up-to-date **TOOL CATALOGUE** for **1898.** 510 pages with index. Pocket size 6¼x4¼, rounded edges and stitched covers. Every foreman of workshop or factory should have a copy. Mailed for 25 cents by

MONTGOMERY & CO.,
103 Fulton Street, NEW YORK.

One-half a million people will visit the Twentieth Triennial Exhibition of the Massachusetts Charitable Mechanic Association, October and November, 1898.

ELECTRICIANS AND MANUFACTURERS OF ELECTRICAL APPARATUS

who wish to avail themselves of this opportunity should send for prospectus, rules and conditions and application form for space. Entrance fee for electrical and mechanical exhibits only five dollars. No charge for space or power. All machinery electrically driven. Plans and full particulars on application to HENRY D. DUPEE, Secretary Executive Committee, Mechanics Building, Boston, Mass.



Wire Flattening Mill, with Mossberg Roller Bearings.

For use in the making of hard flat steel and brass wire, for springs, etc.

This mill is altogether different from others, and the improvements entering into the make-up of this mill enables the owner to handle more work in a shorter time and at a lesser expense than can be accomplished by any similar mill made. Nominate the manner in which you would like us to prove this to your entire satisfaction.

Mossberg & Granville Manfg. Co.,

Providence, R. I.

126 Liberty Street, New York. Exhibition at Philadelphia Bourse.

Chas. Churchill & Co., London and Birmingham.
Schuchardt & Schutte, Berlin.
Mathey Doret, Chaux-de-Fonds, Switzerland.

For

ELECTRICALLY DRIVEN MACHINE TOOLS.

Use the...

KEYSTONE MOTOR.

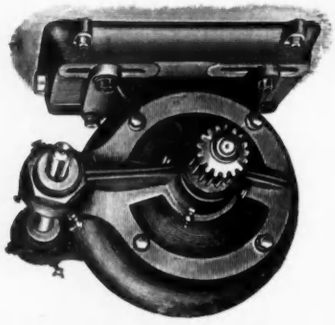
Open or Inclosed Types.
Slow Speed, Cool Running,
Economical, Noiseless.
Adjustable to any position.

Open Type.

KEYSTONE ELECTRIC CO.,

ERIE, PA., U. S. A.

NEW YORK. CHICAGO. BOSTON.



ENCLOSED STEEL MOTORS

for Machine Tool Drive. 1-2 H. P. to 150 H. P.

ANY SLOW SPEED.

WHOLLY ENCLOSED. DIRT PROOF.
WATER TIGHT. NO FLOOR SPACE NEEDED.

INVERTABLE and ADJUSTABLE to any POSITION immediately without loosing a bolt or nut.

Also full line MULTIPOLAR GENERATORS up to 150 K. W.

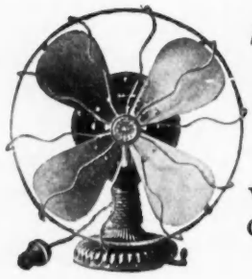
DIRECT CONNECTED AND BELTED TYPES.

NORTHERN ELECTRICAL MFG. CO.,

MADISON, WISCONSIN.

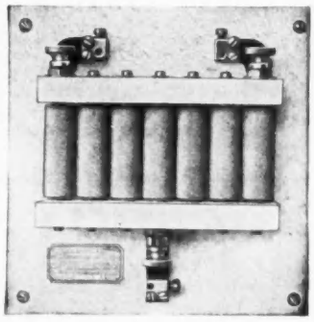
Fan Motors.

Alternating Current.



Two Timely Topics.

We Challenge Comparison.



Lightning Arresters.

Wurts Non-Arcing Types.

New York, Boston, Chicago, Philadelphia, St. Louis, San Francisco, Buffalo, Syracuse, Atlanta, Tacoma, Austin.

Mountain Electric Co., Denver.

For Canada, Ahearn & Soper, Ottawa.

The name of WESTINGHOUSE is a guarantee.

Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

Westinghouse Electric Co., Ltd., 32 Victoria Street, London.

The name of WESTINGHOUSE is a guarantee.

Morse Twist Drill & Machine Co.,

NEW BEDFORD, MASS., U. S. A.

MORSE TAPER SHANK DRILLS.

Nos. 102 and 113,
See pages 8 and 10 of our 1898 Catalogue.

Commerce can never be at a stop while one man wants what another can supply ; and credit will never be denied while it is likely to be repaid with profit.—Dr. Johnson.

BEFORE BUYING

GANG DRILLS,
VERTICAL DRILLS, 13 to 50 inch swing,
PLAIN RADIAL DRILLS,
UNIVERSAL RADIAL DRILLS,
RADIAL DRILLING and COUNTERSINKING MACHINES,
PORTABLE DRILLS,
BOILER SHELL DRILLS or
ENGINE LATHES, 11 to 24 inch swing,

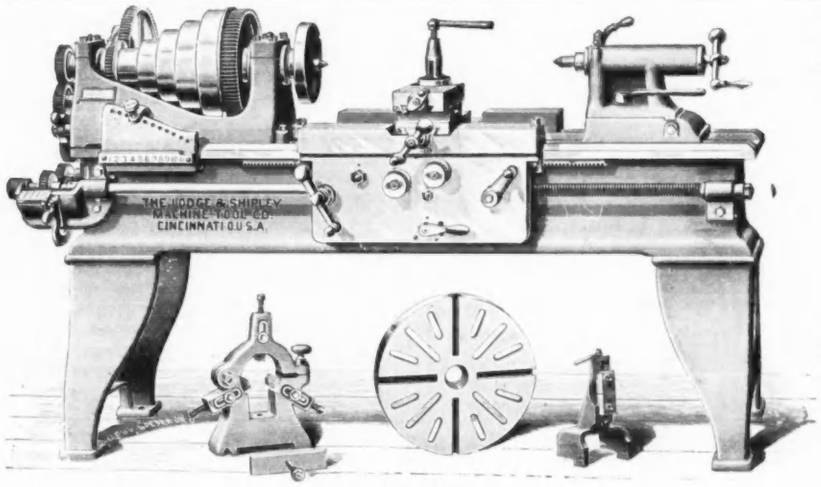
Examine those made by **PRENTICE BROS.**

FOREIGN AGENTS:
Schuchardt & Schutte, Berlin, Vienna, Brussels.
Chas. Churchill & Co., London, Birmingham.
Adolphe Janssens, Paris.

Worcester, Mass., U. S. A.

CATALOGUES FREE.

IF YOU WANT JACKS, Tube Expanders or Punches write to A. L. HENDERER'S SONS, WILMINGTON, DEL



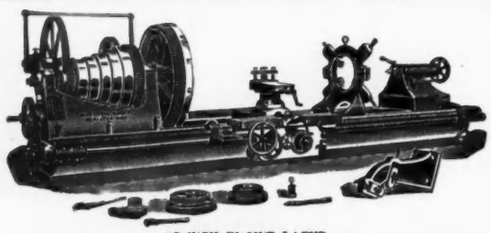
Why Our Lathe is the one for you to buy.

It has easy, quick and accurate adjustments of all feeds.
The range of feeds is very great.
Changes for screw cutting are made instantly ; no gears to take off or put on.
The dimensions are liberal and in proportion to the service required of them.
The Lathe in general is easy to operate.
The workmanship insures satisfaction.

Sizes, 14 inch to 42 inch Swing.
Beds in even lengths.

THE LODGE & SHIPLEY MACHINE TOOL CO.,
Cincinnati, Ohio, U. S. A.

Selig, Sonnenthal & Co., Agents, London, E. C. Adler & Eisenschitz, Milan, Italy.



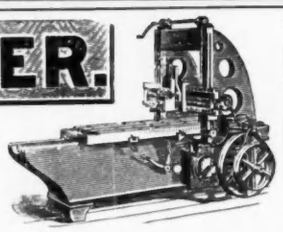
48-INCH ENGINE LATHE.

ENGINE LATHES .·. FORGE LATHES
·.· TURRET LATHES ·.·
SHAFTING LATHES AXLE LATHES

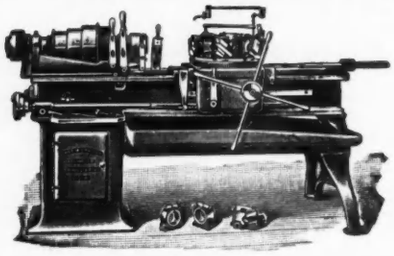
Modern Machine Tools. .. .. Catalogue Free.

The Niles Tool Works Co.
Hamilton, Ohio, New York, Chicago, Philadelphia, Boston, Pittsburg, St. Louis, 39 Victoria St., London, S. W., England.

THE GRAY PLANER.



The G. A. Gray Co.,
Cincinnati, Ohio.
Manufacture Planers as an exclusive specialty.
—Planers only! Nothing but Planers!!



The Flat Turret Lathe

Does Lathe work accurately up to 2 in. diameter by 24 in. long.

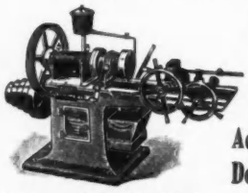
Jones & Lamson Machine Co.,
Springfield, Vt., U. S. A.

Selling Agent for Germany, Switzerland, Austria-Hungary, Russia, Holland and Belgium: M. KOYEMANN, Charlottenstrasse, 112, Dusseldorf, Germany.
England: HENRY KELLEY & CO., 26 Pall Mall, Manchester.

William Sellers & Co. Incorp.
PHILADELPHIA, PA.
MODERN TOOLS FOR MODERN METHODS.

PULLEYS and SHAFTING. Boring Mills, Bending Rolls, Bolt Cutters, Cranes, Lathes, Planers, Slotters, Punches and Shears, Mechanical Stokers, Turn-Tables, Testing Machines, Etc. INJECTORS for ALL SERVICE.

The Acme Machinery Co.,
CLEVELAND, O.,



Manufacturers of
Acme Bolt and Rivet Headers.
Acme Single, Double and Triple Automatic Bolt Cutters. Cutting from 1-8 in. to 6 in. Diameter.
Also Separate Heads and Dies.

"Constant Angle" Twist Drills.

Accurate, Durable, Efficient.

THE T. & B. TOOL COMPANY,
Catalogue free. —Danbury, Conn., U. S. A.

Universal Joint Coupling

Eberhardt's Patent.

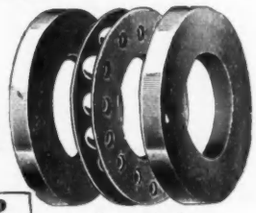
NO weak parts. projections. objectionable features.

State Rights for Sale.

GOULD & EBERHARDT,
Newark, N. J., U. S. A.

EXPORT TRADE A SPECIALTY. ST. LOUIS, MO.

Ball Thrust Bearing.



Patented.

The Ball Bearing Co.
Boston, Mass.

GRANT GEARS

GEAR WHEELS and Gear Cutting of every description.
GRANT GEAR WORKS,
626 Race Street, PHILADELPHIA.
6 Portland Street, BOSTON.
86 Seneca Street, CLEVELAND.
Send for Catalog.

Correspodence solicited.
If you want Light Auto. Machinery. Fine Tools, or Sub-Press Work.
A. F. INESON, WATERBURY, CONN.

PLANED BEVEL GEARS
MACHINE MOULDED GEARS.
Gears up to 12 Feet Diameter.

GLEASON TOOL CO
Mfrs. LATHES and GEAR PLANERS.
6 Race St., Rochester, N. Y.

AMERICAN MACHINIST

A PRACTICAL JOURNAL OF MACHINE CONSTRUCTION.

▲ ▲ ▲

VOLUME 21. NEW YORK, THURSDAY, MAY 12, 1898. NUMBER 19.

▲ ▲ ▲

Making Tank Plates.—I.

BY JOSEPH HOMER.

Tanks are generally made in England with rounding corners at bottom and sides. The plates are bolted together by flanges, external or internal.

In Fig. 1 *A* represents the 4′ 0″ square

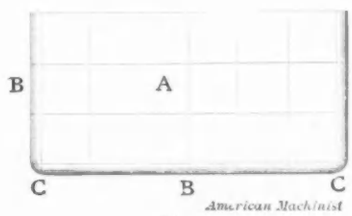


Fig. 1

flat plates, *B* the 4′ 0″ curved side and bottom plates and *C* the triangular corner plates, these comprising all the patterns.

For the square pattern plate a wood pattern is made first, with double shrinkage. The metal pattern is seen in Fig. 4, and a portion of the detail of the wood pattern is seen enlarged in Fig. 3.

Fig. 2 is a portion of the casting, in which *A* is the plate and *B* the flange, *C* the facings for the bolts, *D* the bolt holes, *E* the brackets which strengthen the flanges, *F* the planing strip. The plated portion *A* is an open frame, as shown in Fig. 4, in order to diminish its weight for lifting about. The interior of the frame in the iron pattern is formed during molding with loose plates *K*, seen also in the same figure. The plated frame of the wooden pattern is made of 7-16-inch or ½-inch stuff, framed with half lap joints at the corners, glued and screwed. Corner pieces are glued in to give extra metal next the rapping and lifting holes *a*, *b*, Fig 4, in the iron pattern. The flanges *B* are screwed around the edges. A 5-16-inch projection is nailed round, forming the chipping or planing strip *F*, giving calking allowance. The facings *C* are nailed on at the print centers, and prints for the bolt holes *D* upon the facings. The brackets *E* are nailed midway between the prints for the purpose of strengthening the flanges against the pull of the bolts. Enlarged details of these parts are shown in Fig. 3, in which *A* is a portion of the frame forming the plated portion, *B* is the flange, *C* the facings, *D* the prints for the bolt holes, *E* the brackets, *F* the planing strip. The usual proportion of taper is shown in Fig. 3, averaging about ⅛ inch in flange and brackets and from 3-32 of an inch to ⅛ of an inch on each side of the prints, which are necessarily of the pocket, or drop, form.

In many cases small hollows, or fillets, are inserted around the flanges and brackets. They may average from ⅛ to 3-16 of an inch. Often the facings *C* are omitted, but it is better to insert them, because they afford clean faces for the bolt heads and nuts and grommet washers used in fastening the tank together.

To get a true metal pattern from this wood pattern the latter must be rammed,

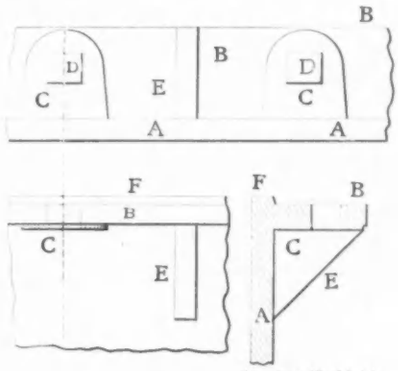


Fig. 2

flange upward, on a true bottom board, and then turned over. The ramming must be even and regular on each side of the flanges, in order to prevent them from becoming crooked and wavy, or out of square, which might easily happen to so flimsy a pattern carelessly rammed.

There is a probability of the iron pattern cast from this coming out with the flanges slightly convex, or rounding longitudinally. It will not exceed from 1-64 to 1-32 of an inch, and is due to the slightly diminished shrinkage in the central parts. Down the sides there is the shrinkage pull of the flanges and plate, pulling the opposite sides together. At the central parts the pull is less, because there is a body of sand forming the open part of the frame, and this resists the shrinkage of the middle parts of the flanges. Hence they usually cool very slightly convex. This can be remedied by lifting the cope and loosening the sand in the center before the plate has quite cooled down. It must not be done too early, or the plate will cool on the top too quickly and curve upward around the sides, becoming hollow in the back. Or the flanges may be put on the wood pattern with a slight concavity to compensate for the convexity which they will assume in cooling. Or, if neither of these things are done, a light planing cut should be taken off the outer vertical faces of the flanges in the iron pattern.

After the iron pattern has been checked over to test its accuracy, the whole of its surface is roughly filed, especially all the vertical faces of flanges, brackets, facings and prints. These need not be made bright, but only made fairly smooth, so that no tiny projections or roughness shall be left to tear the sand down in molding.

Rapping and lifting holes are then put in at the four corners, see Fig. 4, *a*, *b*; ½-inch or ⅝-inch holes being suitable. The plate is then put in the core oven and raised to a temperature a little higher

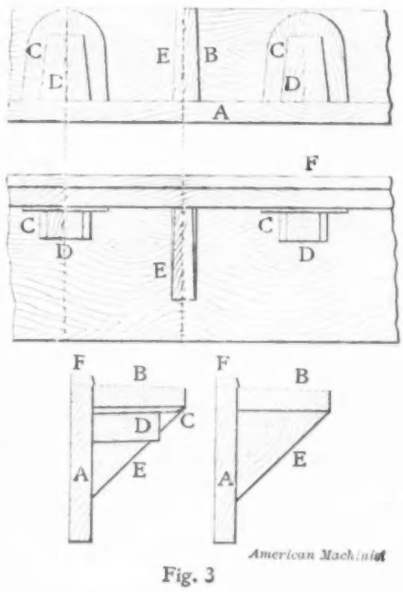


Fig. 3

than the hand can comfortably bear. A lump of beeswax is then rubbed all over it lightly. The plate will then be

In our issue of April 9, 1896, we gave a very full account of the lathe work done on heavy guns at Watervliet Arsenal, West Troy, N. Y. In Figs. 6 to 17, inclusive, we give some additional views of this establishment, which are self-explanatory.

Figs. 18 to 22, inclusive, were taken in the shops of the Niles Tool Works at Hamilton, Ohio. Fig. 18 is a view from the west end of the shop, and shows the pit for the erection of carriages. This shows clearly the "racer" or ring of rollers on which the circular base of the chassis rests. In the foreground is what is called the upper carriage, which is cast in one piece of gun iron, which piece includes the cylinders by which the recoil of the gun is throttled. To this piece the levers which support the gun and counterweights are pivoted.

At Fig. 19 one of the smaller Niles horizontal boring, drilling and milling machines is seen at work drilling holes in the flanges of the base-ring of a disappearing gun carriage. All this drilling is done at one setting of the work, the column of the machine being traversed upon the bed. Immediately back of this machine is the gangway leading from the foundry, this accounting for the bed castings seen there.

Figs. 20 and 22 were taken in the gun shop of the Niles Tool Works. This department is devoted to making breech-loading rifled mortars. At the left of Fig. 22 is seen a special heavy 63 inch lathe, in which a mortar is being turned after five of the pieces composing it have been shrunk together. Two more are put on afterward to complete the piece. This lathe is used also for boring and rifling. Hoops, jackets and trunnion rings are seen on the floor, and, on a small table in front of the lathe, are some Government measuring instruments.

In Fig. 20, which was taken from the opposite end of the same shop, work on breech mechanisms is mainly in view. This shop has a separate electric drive.

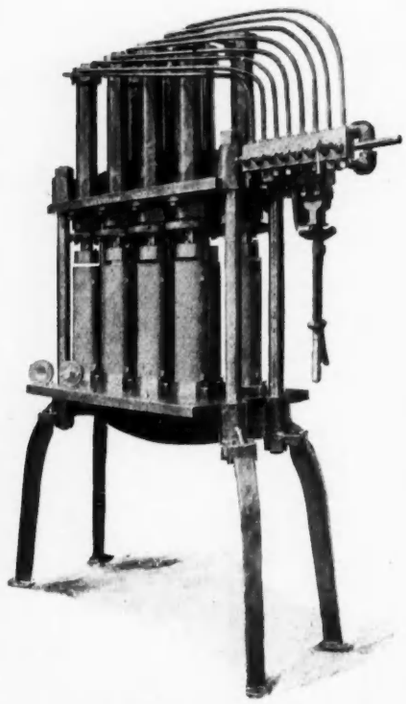
Fig. 21 shows the front portion of the Niles main shop. In the right foreground is a chassis rail and in the background are base rings, two of them in place on the foundations of the erecting pits and one upside down under the arm of a radial drill. In the background is a 10-inch gun sent from Watervliet for testing disappearing gun carriages.

In this figure is seen the headstock for a 90-inch gun lathe, being built for the Midvale Steel Company. The main shop of the Niles Works referred to is 400x101 feet; the one in which Fig. 19 was taken is 327x115 feet; the gun shop is 150x50 feet. The total plant has fifteen acres under cover and employs at present 1,000 men.

Figs. 23 to 26, inclusive, were taken in the shops of the Pond Tool Works, Plainfield, N. J., and show disappearing gun carriages in various positions on the shop floor. No guns or mortars have been made at this establishment, but it is now running night and day on a hurry order for disappearing carriages.

Figs. 27 to 34, inclusive, were taken in the Naval Gun Shop at the Washington Navy Yard. This gun shop is 700 feet long and at present 1,400 men are working there, the ordinary or regular force being about 900. It is in charge of Commander E. C. Pendleton, U. S. N., who organized it and has made an excellent record in gun manufacture. The photographs, with the inscriptions under them, will be readily understood.

Figs. 35 to 42, inclusive, were taken at the Bethlehem Iron Works, South Bethlehem, Pa., where not only the finishing processes on guns are performed, but guns are made from the raw material, the steel being cast into ingots and cooled while under enormous hydraulic pressure,



HYDRAULIC PRESS FOR MOLDING SMOKELESS POWDER.

these ingots being then forged under hydraulic presses. Some of them are forged hollow, *i. e.*, the ingot is bored, a mandrel in inserted and the ingot then forged upon this mandrel, by which processes the very highest quality of metal is obtained.

Fig. 35 gives perhaps the best idea of what a 10-inch gun is like, and the inscriptions beneath the other views sufficiently explain them. They are all especially worthy of attention. The 14,000-ton hydraulic forging press, shown in Fig. 39, is served by a 15,000 horse-power pumping engine, and Fig. 41 is only a little over half of a single shipment of guns from this establishment.

Besides making guns, the Bethlehem Works make forgings for Watervliet Arsenal and for the navy gun shops. Armor plate is also made here, besides large quantities of forgings for private customers. The axle of the Ferris Wheel was made here.

To shop men these pictures tell their own story, and it is an eloquent one.

▲ ▲ ▲

A Smokeless Powder Press.

The press shown in our illustration is one of several types of similar machines designed for the manufacture of smokeless powder, and made by the Watson-Stillman Company, of this city.

Smokeless powder is manufactured into sticks of the caliber needed and cut off the right length to fill cartridges. These sticks contain from one to six holes for the entire length, according to the kind of powder that is used, and these presses are designed to take the powder in a plastic state and press it into sticks for use, and, in shop parlance, are called "squirting presses."

This particular press is an eight cylinder affair, made for the pressing of powder for small calibers. Each of the plungers is 2¼ inches in diameter, with a stroke of 19½ inches. The pressure is 3,000 pounds to the square inch, exerting a total pressure of 12 tons on the material in the cylinders, forcing the same through the die at the bottom into a proper receptacle.

As will be seen the eight cylinders are controlled by one large multi-spindle valve operated by a lever, and each cylinder is provided, in the valve casing, with a separate controlling valve, throttling and governing its speed according to the condition of the materials, or cutting the cylinder out altogether.

Smokeless powder is rather precarious stuff to handle and will not stand very much abuse. This press provides for all emergencies that may arise. The powder may explode in one of these presses without very much damage; it automatically throws up the hydraulic ram.

In each head there is located a vacuum valve and an air valve. The latter is open except when closed by actual contact with material under the ram. If any air gets between the ram and powder, compression heats it and causes an explosion. On the other hand, the too sudden withdrawal of the ram will cause an explosion. Therefore a vacuum valve is provided.

On the sides of the cylinders, top and bottom, will be noticed cast lugs. They are for hooking in bales or handles for carrying the cylinders. The powder is put into the cylinder in a plastic state and kept there until pressed out as needed, the cylinders being taken to the press for this purpose. On the left hand of the table will be seen a die and die holder that go into the heavy plate under the cylinders.

This machine is shown as a specimen

of the work now going on in our machine shops on account of the activity of the War and Navy Departments.

▲ ▲ ▲

Personal.

Lieut. C. P. Shaw, retired, is ordered to the Washington Navy Yard May 2.

Assistant Engineer T. D. Parker, U. S. N., has been ordered to the "Puritan."

Passed Assistant Engineer J. E. Palmer, U. S. N., has been ordered to the "Amphitrite."

Passed Assistant Engineer A. McAllister has been ordered to the New York Navy Yard.

Assistant Engineer H. C. Baughman, U. S. N., has been ordered to the Norfolk Navy Yard.

Assistant Engineer J. T. Smith, U. S. N., has been ordered to the Norfolk Navy Yard.

Assistant Engineer H. E. Rhoades, U. S. N., has been ordered to the New York Navy Yard.

Assistant Engineer W. S. Smith, U. S. N., has been ordered to the Mare Island Navy Yard.

Assistant Engineer J. L. Wood, U. S. N., retired, has been ordered to the Norfolk Navy Yard.

Acting Passed Assistant Engineer Goold H. Bull, U. S. N., has been ordered to the "Prairie."

Assistant Engineer R. E. Carney, U. S. N., retired, has been ordered to the Mare Island Navy Yard.

Passed Assistant Engineer William L. Bailie, U. S. N., has been ordered to the League Island Navy Yard.

Assistant Engineer W. H. P. Creighton, U. S. N., has been ordered to duty with the tug "Mary Wittock."

Chief Engineer R. T. Hall, U. S. N., has been appointed chief engineer, with the relative rank of lieutenant.

Assistant Engineer G. W. Lowe, U. S. N., has been detached from the Naval Academy and ordered to the "Justin."

Chief Engineer C. H. Loring, U. S. N., retired, has been appointed inspector of machinery at the Quintard Iron Works, New York.

Passed Assistant Engineer F. J. Schell, U. S. N., has been detached from the Naval Academy and ordered immediately to the "Badger."

Passed Assistant Engineer R. Crawford, U. S. N., has been appointed assistant inspector of machinery at William Cramp & Sons.

Passed Assistant Engineer L. D. Miner, U. S. N., has been detached from the "San Francisco" and ordered immediately to the "Solace."

Chief Engineer J. H. Chasmar, U. S. N., has been detached from the "Wabash" on the arrival of the "Chatham" at Boston, and ordered to duty in connection with the "Chatham."

Passed Assistant Engineer J. C. Kafer, U. S. N., has been appointed assistant inspector of machinery at the Morgan Iron Works, New York.

We welcome personal items regarding men connected with the machinery business. Kindly contribute what you can to this department.

Chief Engineer D. P. Jones, U. S. N., has been ordered to the works of the Harlan & Hollingsworth Company as inspector of machinery.

Passed Assistant Engineer G. W. Dyson, U. S. N., has been detached from duty with the Fish Commission and ordered immediately to the "San Francisco."

Passed Assistant Engineer G. W. McElroy, U. S. N., has been detached from the works of the Harlan & Hollingsworth Company and ordered to the New York Navy Yard.

Mr. H. M. Norris, who has been with the Bickford Drill & Tool Company, Cincinnati, Ohio, for some time past, has signed a new contract with that company, taking the position of superintending engineer and manager.

James Galabally was running a lathe in the shop of the R. D. Wood Foundry Company, Florence, N. J., when his hand was caught by the chuck and so mangled that amputation was necessary. This is, happily, an accident of rare occurrence, notwithstanding the opportunities which exist in every shop.

▲ ▲ ▲

Obituary.

Robert M. Sanderson, assistant superintendent of the steel plant of the Phœnix Iron Works, died at Phœnixville, Pa., on April 26, forty-five years old.

▲ ▲ ▲

It is announced that the Bessemer Pig-iron Producers' Association has arranged for banking all furnaces for 30 days in order to restrict production.

▲ ▲ ▲

An impact testing machine is being designed for the engineering laboratory of the Massachusetts Institute of Technology. It will resemble a pile driver in general construction, and is to have a 500-pound hammer, with a drop of about 8 feet. It can be used for both transverse and longitudinal tests, so as to indicate the effect of impact in cross breaking and compression. Another machine for which designs are now in hand is intended to show the effect of repeated tensile and compressive stresses, and will have a capacity of 100,000 pounds. The stresses are to alternate between tension and compression at the rate of 60 turns a minute.

Commercial Review.

NEW YORK, Saturday Evening, April 30, 1898.

DYNAMOS AND MOTORS.

It is undeniable that the electrical market suffered somewhat from the anticipation and realization of war, and that its votaries are looking into the future with blank perplexity as to how far it will be affected hereafter. And yet the injury so far has been less than one might suppose. Not only is there a large amount of Government work to compensate for much of the retardation in regular trade, but several of the progressive medium sized concerns which build and sell dynamos and motors for lighting and power purposes generally inform us that there has yet been no appreciable curtailment in their orders received or that such curtailment has been small.

The vital point of trade at which the war excitement chiefly strikes is the financial or capitalization part. Hence new street railway work is particularly under its influence, because of the difficulty of floating bond loans. Electrical power transmission systems are also being retarded. A representative of one of the larger companies told us that he had in mind three such enterprises, evidently important ones, the contracts for which were being withheld because of public lack of confidence.

And in general it may be said that people are not inclined to buy electrical material that they can get along without. In placing their orders they are disposed to call for just what they need at the time being and no more.

But in spite of all this, as we have said before, the electrical business has yet suffered comparatively little from the war scare and the war. This may in part be due to the fact that enterprises for which dynamo and motor orders are now being placed were under headway before the "Maine" disaster.

It is understood that the General Electric and the Westinghouse Companies are doing a large amount of electrical work for the Government. The General Electric Company is preserving some reticence as to the nature and extent of its Governmental business. We are informed, however, that its contracts now on hand, not limited to this, are sufficient to keep it busy for four months, and that its April orders are largely in excess of the estimated amount for the month. Probably a large part of this trade is in supplies and sundries other than dynamos and motors.

An electrical outfit for lighting and power, to be installed in Fort Delaware, near the Delaware River, has been contracted with the C & C Electric Company. Two 40 horse-power Ames engines and a 100 horse-power boiler, also

(*Continued on page 45.*)

AMERICAN MACHINIST

Published Thursdays by

American Machinist Publishing Co.,

256 Broadway, New York.

JOHN A. HILL, President and Treasurer.

C. A. HANSMANN, Sec'y.

Editorial Department.

FRED J. MILLER, Chief.

FRANK RICHARDS, F. A. HALSEY, EDWARD P. BUFFET, } Associate Editors.

Illustration Department.

A. L. DONNELL, Chief.

Advertising Department.

C. P. DAY, Eastern Representative.

J. M. WAKEMAN, Western Representative.

Foreign Agents:

R. E. HOWARD,
10 Finsbury Square, London, E. C.,
Representative for Great Britain.

FENWICK FRERES & CO.,
21 Rue Martel, Paris,
Representative for France, Belgium, Switzerland and Italy.

WEEKS & JOHNSON,
Lovedoy St., Johannesburg,
Transvaal Republic,
Representative for South Africa.

Space in advertising pages only is for sale.
We invite correspondence on subjects pertaining to machinery.
Name and address must always be given, though not necessarily published.
Communications for or relating to the reading columns should be addressed to the Editor. All business communications should be addressed to the Company.
Subscribers can have their mailing address changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once. Date on wrappers denotes week with which subscription expires.

Subscription Price:

$3.00 a year in advance, postage prepaid in the United States, Canada and Mexico.

$4.00 a year to other countries, postage prepaid.

Entered at Post Office, New York, as second-class mail matter.

For Sale by Newsdealers, Everywhere.
No back numbers beyond 1897.

▲ ▲ ▲

War and the Machinist.

War is certainly never a desirable thing for its own sake, and is to be avoided whenever possible. But it is sometimes justifiable and even necessary, and it is hard to see how the present one could have been avoided or even long postponed.

We cannot expect Spaniards to take any other than the Spanish view of Cuba and Cuban affairs. Our point of view is necessarily different, and when we consider for how long the Cuban question had been an annoyance and more or less of a menace to us it is clear that a definite settlement of it one way or the other had become a necessity.

The best we can now hope for is that the war will be a short one, that at its end the Cuban question will be forever settled and that our relations with Spain will be such that no further cause for irritation or bad feeling on either side will be likely to arise.

The heaviest burdens of the war will not fall upon those who are now exhibiting their patriotism by giving or selling yachts to the Government, but upon those who have little else but life and limb to give, and who, if they survive, or if they do not survive, then their children, will pay, directly and indirectly, in taxes almost the entire cost of the war. It is safe to say that if these people in both countries had been in control of affairs there would have been no war. Their vital interests are identical, whether they live in America or in Spain. Carlyle has vividly portrayed the essential absurdity and foolishness of such men being raised to be stood up in lines confronting one another and shot; but it is a foolishness which the world has not yet outgrown.

This being the case, we can only rejoice that our highly developed mechanical skill gives us so much decided advantage, and the machine constructor, whether he manages an establishment, bends over a drawing board, operates a machine tool or shoves a file, may congratulate himself that his skill is as indispensable in modern warfare as in peaceful pursuits, and, what is more, that experience gained in the present war may lead to such revision of ideas and plans as to make the machinist still more in demand for preparation for the next war, whenever and wherever it may occur.

It is to be hoped that the time will come when there will be no more wars, but so long as there are to be wars the machinist may console himself with the thought that whatever interference with his business war may cause in some directions is more or less balanced by stimulus imparted to it in others, and that the development of war methods seems likely to call for a still greater proportionate demand for his skilled service.

▲ ▲ ▲

Some Figures.

We cannot go into details regarding the respective capacities of the establishments illustrated in this issue, but we have obtained figures which enable us to present some aggregates that may be interesting. The five works mentioned as making guns and mortars can complete them at such a rate that, supposing a month's production of guns to be discharged simultaneously, the combined weight of all the shots would be 18,871 pounds, and if all of them were to work continuously night and day the combined weight of all the projectiles thrown from guns produced by one month's work would be 37,742 pounds. Assuming a muzzle velocity of 2,000 feet per second, there would be stored in these projectiles 1,173,569,652 and 2,347,139,304 foot pounds, respectively. To get an idea of what this means let us compare it with locomotives.

Suppose a passenger locomotive weighing 100,000 pounds to be traveling 40 miles an hour. Its stored energy, or the number of foot pounds of energy with which it could strike an obstacle, would be $\frac{100{,}000 \times 3445.7}{64.32} = 5{,}349{,}813$ foot pounds. It is thus seen that 219 such locomotives moving at 40 miles per hour would be required to exert the same amount of striking force, and if the shops were working continuously throughout the twenty-four hours the guns they would turn out in one month's time would throw at a single round shots having as much combined stored energy as would be in 438 locomotives, each weighing 100,000 pounds and moving at 40 miles per hour.

A shot from a 13-inch naval gun weighs 1,100 pounds. Assuming a muzzle velocity of 2,000 feet per second, such a shot has stored in it at the moment of discharge 68,407,960 foot pounds of energy, or nearly thirteen times as much as would be in a locomotive when moving 40 miles per hour.

▲ ▲ ▲

Our "Special Number."

This number of the "American Machinist" is larger than usual and considerably more expensive. It is actually a special, *i. e.*, a distinct or singular number. It is not, however, what is commonly known as a "special number." It is unaccompanied by any blowing of trumpets or efforts to secure extra advertising to pay for the extra expense—with a profit. We do not put the cart before the horse by getting up special numbers as a peg to hang extra advertising business upon. This number has been prepared solely to present adequately to our readers some things in which we think they are especially interested at this time. We expect to treat special subjects in a special way when occasion demands it, but the only way in which readers (or advertisers) can be sure of getting the benefit of our "special numbers" is to make use of every number. As the train boy puts it, "There's a prize in every package."

▲ ▲ ▲

In Massachusetts a law has passed the House prohibiting deductions of wages of women and minors employed in manufacturing establishments on account of stoppages of the power.

▲ ▲ ▲

All who are interested in fine mechanical work and like to see people get paid for doing it will regret to hear of the financial troubles of the E. Howard Clock & Watch Company, of Boston, and will hope they will be able to adjust their difficulties and go on.